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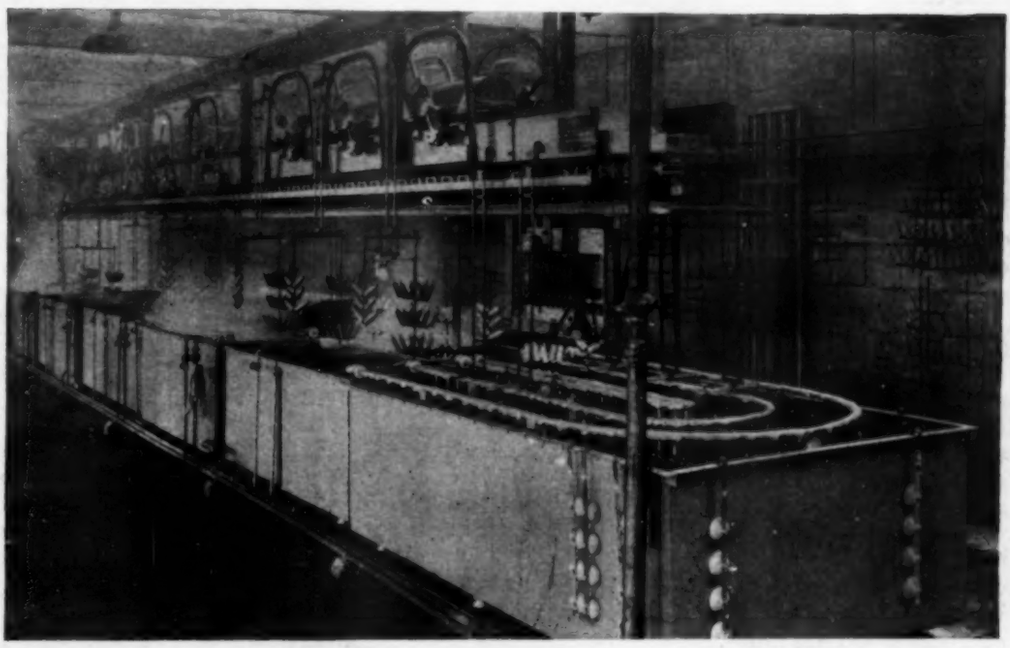
Economies with
Automatic Plating Equipment

By Floyd T. Taylor

Vice-President, Hanson-Van Winkle-Munning Company



Full automatic electroplating installation with a possible cycle of thirteen operations. The drying oven is on the opposite side, next to the loading and unloading station

THE FACTORS which determine whether it is advisable to increase the capacity of a manually operated plating department, or to install full automatic equipment, depend upon so many variables that they will not be considered in this discussion. This discussion of the economies of full automatic equipment, as contrasted with manually-operated methods, will be limited to the installation of new equipment where no plating facilities have previously existed, or where conditions have made it advisable to scrap the old equipment and install a new department without reference to the method to be used.

Every electroplating process normally divides itself into three major operations. These operations are: (1) The preparation of the base metal, (2) electrodeposition, (3) the final rinsing and drying.

When a base metal is made chemically clean by being freed from grease, scale, or oxide it does not remain so if the electroplating process does not follow immediately after the cleaning treatment. If there is a delay between the two operations, some, if not all, of the cleaning treatments must be repeated. Similarly, directly after the work is removed from the electroplating bath it is necessary to carry it rapidly through the rinsing and drying treatments, otherwise the electrodeposited coating will be partially, if not wholly, spoiled. The transportation of the work therefore, through the successive steps

of an electroplating treatment, is a problem of continuous transportation. This method of transportation is provided by full automatic equipment, because the conveyor is designed to do exactly what is required for the production of satisfactory electrodeposited coatings, allowing a predetermined time for each and every operation from cleaning to drying.

Machinery is economical, as compared with manual operations, only when the reduction in factory costs through its use more than offsets the interest and depreciation on the extra investment. Factory cost consists of three elements. These are: (1) Material, (2) direct labor, and, (3) factory burden. Any one of these three elements can be further sub-divided, and any one of them can be "loaded," to use the common shop term. In this discussion, however, "material" is intended to mean the actual cost of the materials used. Direct labor is intended to mean the actual sum of money paid for wages to those who do work with their hands in connection with the electroplating equipment, while "factory burden" is intended to mean all the other expenses of the department, such as light, heat, power, rent, depreciation and upkeep, insurance, supervision, and miscellaneous costs.

Discussing separately the three elements of factory cost, let us begin with materials. The materials used in electroplating are the soluble anodes and the various chemicals for making or maintaining the several solutions. The metal deposited in electroplating comes from two sources, the metal anodes and the metallic content of the chemical salts composing the electroplating solution. The proportion of the total metal needed, obtained through anode disintegration or through the use of additional metal-bearing salts, varies somewhat under differences of operation. The total amount of metal, however, that is required to electroplate a given production with a coating of specified average thickness remains constant, regardless of the type of equipment used in the plating room. From an operating standpoint the metal cost can, therefore, be considered as a constant.

The cost of chemicals is less, and can be kept to a minimum, when full automatic electroplating machines are used. The following factors are responsible for this: (a) For a given quantity of electrodeposition a smaller volume of the various chemical treatments is needed, (b) a closer chemical control is practical, (c) "drag-out" losses can be reduced without increasing the direct labor costs through the use of so-called reclaim rinses.

Automatic equipment eliminates all the direct labor cost of electroplating with the exception of the labor required to place the work on the plating machine and to remove it at the end of the cycle. Most electroplating cycles involve six or more separate treatments while some of them require more than ten. The labor of lifting the work in and out of these separate treatments is eliminated, and the direct labor cost, therefore, is less with full automatic machinery than it can possibly be with manually operated tanks.

Under "factory burden," a number of items are lowered through the use of full automatic machinery. Rent is reduced because of the reduction in floor space needed for any given quantity of plating. Upkeep is lower because fewer tanks are needed. And the item of supervision is also lowered because the number of direct laborers engaged is always less and it is unnecessary to supervise closely either the time element or the electrical conditions in the plating operation.

It is obvious that every job, when analyzed, will give a different answer. In a typical case, using the copper and nickel plating of 1,500 radiator shells per day as a basis, the following contrast of the two methods was shown:

Kind of Equipment	*Floor Space*	*Number of Men*
Manually operated tanks	7,902 sq.ft.	18
Automatic machines	1,040 sq.ft.	2

With the manually operated tanks the quality of plate was variable, with a quantity of rejections due to burns, digs and scratches. Under the salt-spray test, failure resulted in from 5 to 10 hours. The plate turned out by the full automatic machines was uniform, with almost no rejections because of imperfections. Under the salt-spray test the plate lasted more than 15 hours.

An analysis of the above reveals the following facts: The space required with manually operated tanks is about 7½ times as great as that needed when full automatic equipment is used. Nine times as many direct laborers are required when manual operation is used and, assuming that the sixteen men saved in this example are paid $6 per day each, the saving in labor costs is $96 per day. Based on 300 working days, this means a saving of $28,800 per year. As previously pointed out, the savings in direct labor form the most convenient starting point for an analysis of allowable investment for equipment which enables such savings to be made.

Advantages of full automatic plating equipment include savings in plating materials, greater uniformity, less scrap, lower labor costs, and less floor space. It is not necessary to have a large volume of work or to keep equipment going continuously to justify installation

One of the popular notions with regard to the scope of full automatic electroplating has been that full automatic equipment is justified only when a large volume of production is involved. While the savings which can be made through the use of such machinery are somewhat proportional to the quantity of production, it is a fact that oftentimes with a very small production sufficient savings can be made to justify not only the installation of full automatic equipment as an original investment, but even the conversion of an existing manually operated plant.

For instance, a full automatic plant designed to nickel-plate 4,480 racks of miscellaneous brass hardware in a 50-hour week would require one man for both loading and unloading. The manually operated plant would require six men to carry the racks of work through the various treatments. Again basing the labor cost at $6 per day per man, it is evident that there will be a saving in direct labor cost of $30 per day when a full automatic

layout is used for this job. Such a saving elsewhere in the shop would be taken advantage of immediately.

Another element of operating cost which should not be overlooked is the cost of reprocessing rejected work. When full automatic electroplating machines are used, rejected work can generally be reduced to a negligible quantity. With manual plating it frequently runs as high as 15 per cent of the total production. A piece of electroplated work which has to be reprocessed usually has to be stripped of the plated coating that has been improperly applied. It frequently has to be repolished, and it then has to be put through the complete electroplating process for a second time. The final finishing cost, therefore, of a piece of rejected work is more than twice the cost of the piece of plated work which comes through the process originally in a condition that is satisfactory.

In former times it was believed that only such jobs as nickel, copper, brass, or zinc plating could be successfully done with full automatic machinery, but silver, cadmium, and chromium-plating are also being done now on automatic machines. These machines further lend themselves perfectly to the production of compound electro-deposited coatings. For example, steel may be cleaned, coated first with nickel, then with copper, then nickel, and finally with chromium, then rinsed, and dried ready for packing and shipment.

Standardizing Names of Die Set Parts

MISUNDERSTANDINGS arising from confusion as to names of machines or machine parts waste more time and money than many realize. To eliminate waste due to this cause, Technical Committee No. 9 of the American Society of Mechanical Engineers that is considering the standardization of punch and die holders, begins its work by recommending that the present name of Punch and Die Holders be changed to "Die Sets" as covering the subject more completely. It also recommends the following definitions for die set parts:

Die Sets: The name given to the complete unit.

Punch Holder: The name given to the upper member of a die set.

Die Holder: The name given to the lower member of a die set.

Guide Post: The portion of a set connecting the upper and lower units.

Guide Bushing: The part into which the guide post functions.

Guide Holes: The openings in either the punch or die holder into which the guide posts or guide bushings are placed.

Shank: The projecting portion of the punch holder which enters the hole in the ram of the press. Standard shanks may be of the inserted or integral types and either round or dovetail in shape.

Flange: The portion of a die holder or punch holder to which the die holder or punch holder is bolted or clamped to the press.

If any user or maker feels that these definitions are not clear or can be improved upon, he should communicate with Mr. S. Diamont, chairman of this committee, in care of the American Society of Mechanical Engineers, 29 West 39th Street, New York.

SEEN · AND · HEARD

By JOHN R. GODFREY

Aluminum in Railway Cars
Gas Bubbles in Castings
Patents that Are Not New

FEW things have changed more in the past quarter century than the materials we use and the attitude toward them. Notable among them is aluminum and its alloys. Originally disappointing to its friends, with about the strength of a custard pie, and having other deficiencies, we now have aluminum alloys that are replacing steel in certain places. An outstanding achievement is the extensive use of aluminum alloys in nearly five hundred passenger cars, of which three hundred and sixty-eight are on steam railroads.

In some cases only the upper structure is of aluminum alloy, in others the underframes are made of the light metal, except for bolts and rivets. The weight saved varies from ten to forty per cent, depending on whether we consider total car weight or only the weight of the certain parts in which aluminum predominates.

But the fact that nearly five hundred cars in which the new metals play an important part are in use gives the aluminum advocates something to boast about.

* * * *

EVIDENCE multiplies regarding the importance of the chemist and metallurgist, as I have pointed out previously. A late case in point is the effort to secure aluminum castings free from the "speckles," or pin holes, that have been the bane of the aluminum founder. From our experience with other metals we have been under the impression that pin holes indicate dirt or dross in the metal. After considerable study, however, the metallurgists tell us that these minute holes are caused by gases, mainly hydrogen.

The growing knowledge of gases is bringing the metallurgists to the point of considering the possibilities of introducing new gases that may eliminate the pin holes and perhaps endow the metal with greater strength and other valuable properties. We have gas-filled lamps. Perhaps we may have gas-filled castings as well.

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PATENTS are funny animals, and a decided mystery to many of us. But it is a lot easier to criticise the Patent Office than it is to tell those in charge just how it should be run. I saw a device the other day that is attracting quite a little attention in some lines. It apparently works well and has the advantage of being very simple.

Something in the back of my think tank told me I had seen it before but I couldn't quite locate it. A friend, of about the same vintage as myself, and I finally located the device in the shop of a mutual friend, many years ago. He had also patented it but could not make it go, commercially.

Had the examiner overlooked this—or decided it was different? And, if it had not been patented, how would he have known of it?

EXECUTIVE · FORUM

Friendliness in Business

"I WONDER if you could sit in at a meeting at our plant, this afternoon, Mr. Holland," said Jim Matthews, president of one of the shops in the local industrial district.

"What's the trouble, Jim?" asked Holland.

"We have a new director who thinks we don't buy as close as we could and should. He wants us to specify everything down to the last dot, forget our old vendors, and cut out what he calls the 'friendship stuff.' May be you can persuade him that this is the wrong attitude to take."

"I'll be glad to come over, Jim. I've just had some interesting experience with a man of that kind, and I don't mind arguing the case with another. To me, this subject is one of unusual importance."

The new director, Joshua Armstrong, was a man who believed in direct, vigorous action. As soon as the meeting began, he started the ball rolling with an attack on the company's purchasing methods.

"One great trouble," said Armstrong, "is that in most plants those who do the buying get too friendly with the vendors. This situation makes it hard to keep relations on a strictly business basis. And buying is one thing you've got to be hard-boiled about. When it comes to making a deal, sometimes you can't trust even your best friend."

"Did you ever stop to think, Mr. Armstrong, that in making that statement you are practically condemning every manufacturer, including ourselves, as unreliable, as little better than crooks?" asked Matthews. "That may have been true once, but I'd hate to think it might be so now."

"Perhaps I put it a bit strong, Matthews, but you have to watch most of them mighty close. There is always the temptation to 'put over a fast one' on some purchaser whose friendship may cause him to ease up on inspection and accept what he buys, or agree to a price, merely on the 'say so' of the man doing the selling."

"Not if you play fair with the seller, Mr. Armstrong. If you try to put over a smart, questionable deal from the buying angle, you are very apt to get 'stung,' and you deserve it. But I can't see doing business with your hand on your gun all the time, so to speak. I wonder if Mr. Holland has had any experience along this line lately?" as he turned to Holland.

"Yes, I have, and only last week, Matthews. ran across such a fine example of friendliness and fairness that when I tell you about it, I'm sure you will think human nature isn't so bad, after all. A man wanted to buy a new planer and trade in his old one for all he could get. No builder really likes to take an old machine in trade, but it's part of the game, frequently.

"The buyer told the maker that the planer was O.K. as far as he knew. He said it was on the job every day, but wasn't heavy enough and, of course, not so serviceable as a new one. Before the old planer arrived at the maker's plant, however, the customer called him on long distance and told him that he'd been mistaken about the planer. He had just learned that the bed was cracked and that several other defects existed that he didn't know of when the deal was made. He hadn't intentionally misrepresented it, he said, and was perfectly willing to take whatever the maker felt it was worth, even if it wasn't more than scrap price."

"Sounds almost like a fairy story, Mr. Holland," said Armstrong. "I certainly respect a man such as you have told us about, but I don't believe business can be done succesfully that way in most cases. The maker should not have made a price without examing the old planer thoroughly. And if he made a price then he should stick to it. This exceptionally polite stuff don't go in modern business, to my way of thinking."

"I'm afraid I can't agree with your slant on the business world of today, Mr. Armstrong. As a matter of fact, I run across more and more cases where men go out of their way to act squarely.

"Also, I'm convinced that you're on the wrong track when you recommend forgetting friendship in business. Friendship means more than a handshake and a smile. It means going out of your way to see that the man you do business with gets a square deal."

Executives are invited to discuss the problem involved in the foregoing case. They are also urged to use this department to air their own problems. A letter to the Executive Forum Editor is all that is needed.

DISCUSSION

Holland Suggests an Engineering Council

One of the largest companies engaged in the manufacture of electrical equipment developed an effective system for the betterment of its products. When some manufacturing problem arose in the shop, the chief engineer assigned one of the research engineers to help solve it. Sometimes a change in design of the product was necessary, or the scrapping of old tools and the fabrication of new ones.

A sound-proof room in the laboratory housed a large, modern technical library. Every foreman and executive was privileged to use this room, and to consult the chief experimental engineer or his assistant there at any time during the day.

Showcases in the laboratory contained samples of every product manufactured by the concern, usually cut cross-sectionally for examination. This display was open to all employees in the plant, and any of them who made a useful suggestion regarding improvements to products received a bonus.

At a general meeting called each month the chief experimental engineer and his assistants, the department foremen and their assistants, and any employees with useful ideas concerning the company's products, were allowed to present their suggestions, aided by sketches which they could make on a large blackboard. A committee composed of the chief experimental engineer, chief designer, and four foremen, one each from the machine shop, assembly room, pattern shop, and foundry, passed upon all new ideas placed before the meeting, but a general discussion was allowed from the floor. Through these means many valuable suggestions were developed and put into effect.

—Frederic A. J. Schmidt, *Industrial Engineer Western Electric Company, Kearny Works.*

Reducing the Scrap Heap

Spoiled work often results from attempting to force a job through in minimum time. Consider a typical case of a gun-metal casting requiring the drilling of various holes for shafts to carry gearing. The center distances between these holes must be maintained within limits of a thousandth of an inch. The method followed in setting a price on the drilling job is often to run through a trial job at a moderate speed and base the time and piece price on the record thus obtained. When the job is set up as a production proposition, however, the drilling machine operator is told to "sail away." He therefore speeds up the work in order to earn his day rate, or perhaps his bonus. The inspector later finds the centers out so much that the gears on the shaft may be a few ten-thousandths too close, and hence the job has been spoiled. The cause of course, is that the drills by being forced have generated heat, thus expanding the castings so that the work turns out different from the trial job.

I have seen drilling machine operators put "on the carpet" for a job like this when the fault has really been with the management. Preplanning of the work, with speeds, feeds and piece-rates or bonus rates set by time study men thoroughly familiar with shop operations, can do much to prevent the spoilage of work from causes such as this.

J. T. Towlson, *London, England.*

Overtime vs. a Longer Working Day

If a firm puts its highly skilled employees on short time during a slack period, rather than lay them off, it is probably as much because it does not wish to lose the advantage of the specialized skill and experience that they possess, as it is because the company wishes to keep the wolf away from their doors. Employees are not ordinarily called upon to share the company's losses in slack periods, and consequently they usually are not given a share of the gains when output is increased.

But if the increase in business calls for extra work, overtime should be instituted. If working hours are increased 25 per cent, overhead will increase by perhaps as much as 10 per cent, but the decrease in net overhead per man-hour will probably provide for an overtime rate of about 50 per cent above the regular wage-rate. The men are entitled to this extra amount on an overtime basis, because of the increase in their working hours.—H. James, *Birmingham, England.*

Hiring Men From Other Shops

When a company has a good position open, it should first of all endeavor to fill the job from among its own employees. When promotion in a company is based upon meritorious work, the hope of advancement keeps each man on his toes to do his best.

If a diligent search fails to reveal the right man to fill the job, within the organization, then it is time to make an offer to some man from another shop. If this man's present employer really needs him, he will make it worth his while to refuse the new offer. If he can get along without him, or if the prospects open to the man are better in the new position, it is only fair for the present employer cheerfully to release the man, so that he can accept the opportunity. No advantage is gained by keeping men in a rut when they are unwilling to stay on a job. Moreover, exchanging men between companies spreads ideas which are mutually useful to these concerns.

—L. O. Brown, *Toolroom Foreman, Holcomb & Hoke Manufacturing Company.*

Monorails—the Carryalls i

Fig. 1 — Starting Studebaker "President 8" motors on their 1,600-ft. journey from the end of the motor assembly line to the chassis line. Each motor weighs about 900 lb., and is loaded onto the monorail by means of the 1-ton bridge crane shown. The motors are spaced 10 ft. apart, and the conveyor travels at 10 ft. per min. The total weight in motion is about 175,000 lb., the total length of the line being 2,800 feet

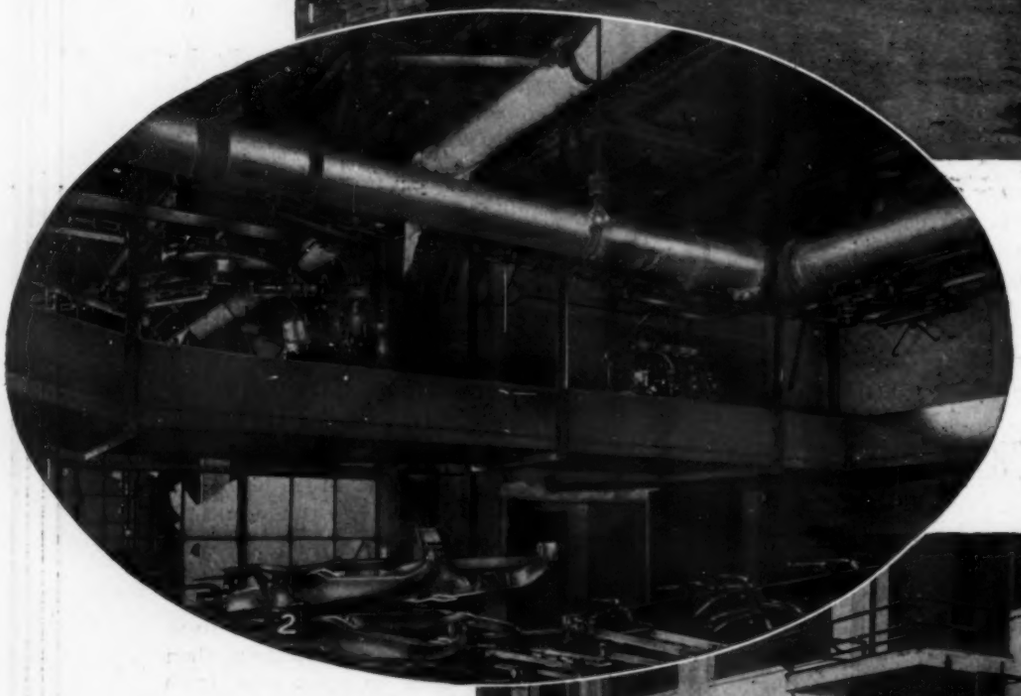

Fig. 2—These two drive units are both coupled to a 7½-hp. motor through a speed reducer and countershaft. The drive units share the load about equally. Ball-bearing trolley wheels are used to reduce friction, the chief load. In going around corners the chain bears against a number of ball-bearing idlers

Fig. 3 — For safety, a heavy wire screen is placed under the motor line in case the motors slip from the hooks. Drop forgings are used for the trolley wheels and parts, and a channel piece connects two trolleys and acts as a load bar. The chain itself is made of high-carbon steel, and is capable of pulling 60,000 lb. Safety dogs at the top of the incline prevent the motors from running back down hill, should the shear pin on the drive be cut

ls in the Studebaker Plant

Photographs by courtesy of the Jervis B. Webb Company

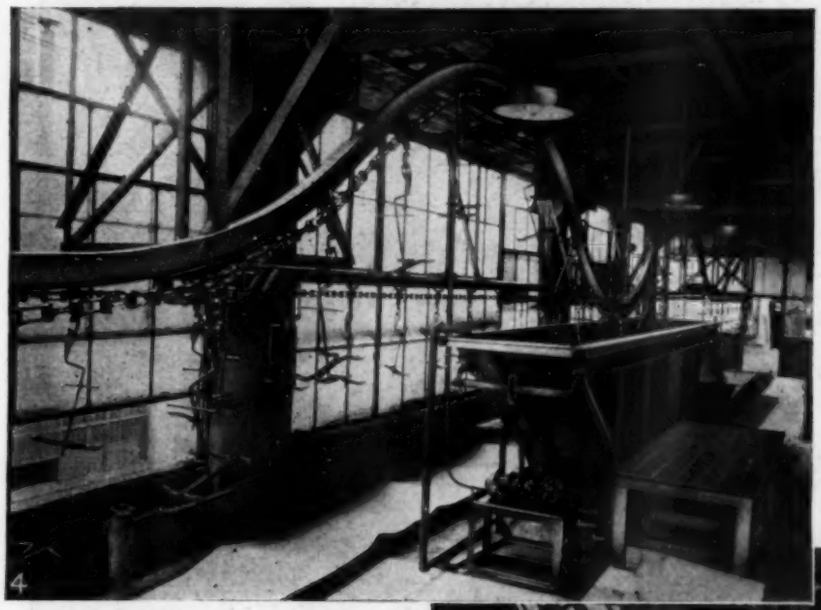

Fig. 4 — Standard I-beams bent to shape are used in this installation. At this particular point, the work, supported on racks, is lifted clear of the dip tanks, is dipped and then is lifted out and clear again. Sheets of paper catch the drip and are renewed at frequent intervals to reduce the fire hazard

Fig. 5 — Another paint line, showing how simple fixtures may be used to support ring-shaped parts. At this point the sprayed parts are about to enter the baking ovens. With the low temperatures involved it is possible to run the conveyor directly through the furnace. Trays are used to catch the drip in this case

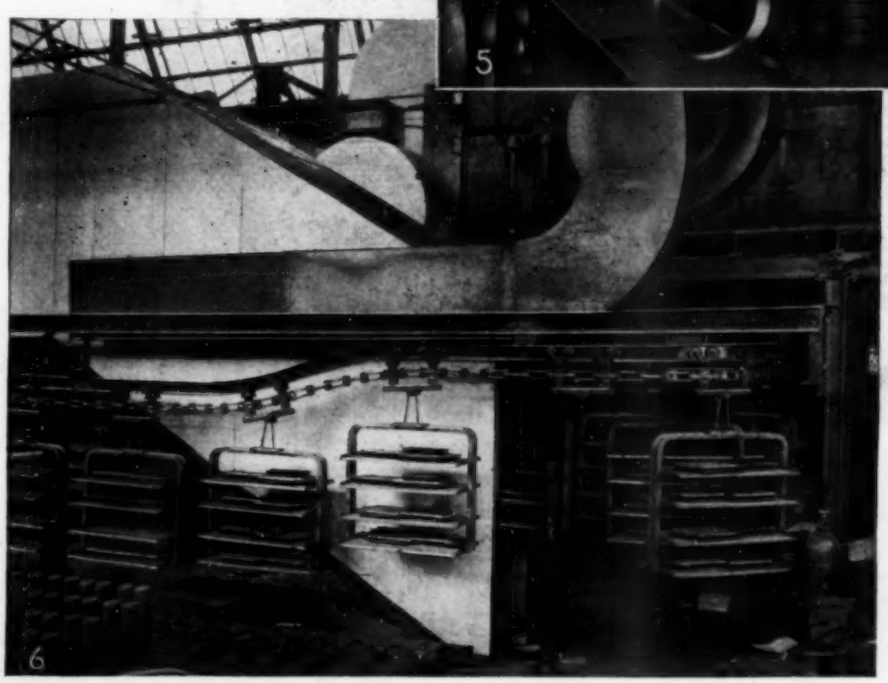

Fig. 6 — These trays, which carry cores into the oven for baking, are made of structural shapes and sheets. The conveyor doubles back at this point and goes up the incline. Gravity seals the open end against the outflow of warm air from the ovens

. . . *Monorails—the Carryalls in the Studebaker Plant*

Fig. 7—Two monorails in parallel, laid out to clear wall supports and an aisle, carry parts up two flights. The crate-like holders are specially-designed carryalls for various chassis details, such as the floor rugs shown or the instrument panel, which can be seen just under the arch. Fig. 8—Simple fixtures carry alternately wheel and brake assembles complete. The rollers on the turn can be seen. No holes are punched in the I-beam rails. These rails are held by clamps at varying intervals, depending upon the load carried, and are spot welded at the ends at the bottom. For light loads only a single pair of trolley wheels is necessary. The entire installation is light, but strongly built.

ABSTRACTS OF CONVENTION PAPERS

The following are abstracts of some papers presented at recent meetings of the A.I.M.E., A.W.S., A.S.S.T., and also the American Railway Tool Foremen's Association

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Welding at Watertown Arsenal

By MAJOR J. B. ROSE
Ordnance Department, United States Army

THE Watertown Arsenal is the center for manufacture of anti-aircraft artillery carriages and of the heavier types of artillery carriages used by the Army. These structures involve extensive use of casting and structural plate. Sound castings are difficult to procure and even after they have passed the usual acceptance tests, one is by no means sure that failure in in service will not occur on account of shrinkage cracks or other undiscovered defects. At times, we have been forced to accept and put in use castings which show porosity, sand pockets, and even shrinkage cracks if these do not appear too serious. Failure of Ordnance material in war is too vital in its consequences to permit reduction in quality. Certainty of performance must be assured as nearly as it is humanly possible. Mechanical power is limited in the zone of an Army, and therefore mobility or lightness must be given very great consideration in design. Lastly, other things being equal, economy in construction is an important factor, even though in war it must be held subordinate to time.

These and other considerations have led the Watertown Arsenal during the past year to take up seriously under directions from the Chief of Ordnance the application of electric arc welding in building artillery.

As we see the problem of welding, it consists in the selection of the proper structural materials, which is controlled in part by the purpose of the structure and design factors, the selection of suitable electrode material and technique, the correct treatment, if any, after welding, inspection and testing of work, and always a certain amount of first-hand investigation and research, such as tests of trial welds, X-ray examination, metallurgical and metallographic inspection, and other physical tests to establish correct practice and to find out just what the welds really are.

X-ray examination of experimental welds and of production work has been of the greatest value in revealing use of improper materials and poor methods or workmanship; that is, in checking on technique in every aspect. All of the welds tested were first X-rayed and the degree of porosity, continuity and penetration of welds were clearly shown. It is believed that in new gun carriages of nickel steel, X-ray examination is very desirable and will insure good work in production if checks are continued at intervals on the product. It is clear that in this way the X-ray may be used as an important adjunct in inspection of product, particularly where inspection by other methods is impractical.

A metallographic study of several welds was made. The welds were of the three-layer type, the first or central layer representing the fusion of the plate ends, with some filler rod addition, the second and third layers representing the building up of the weld to the thickness of the plate. The welds generally have only a few voids; those voids occur at the bottom of the V's.

The metal in the various layers of all the welds has a carbon content of less than 0.20 per cent, regardless of the carbon content of the rod used. The heat resulting from the addition of the second and third layers refined the structure of the plate and of the first layer except the structure of the metal of the plate, adjoining the third layer. This structure was coarsened. The heat resulting from the various layer formations destroyed any martensite that formed and left the structure of the plate in the neighborhood of the weld in a troostitic condition which rapidly changed to sorbite and thence to that of the unaffected plate, passing in the direction from the weld to the unaffected plate.

On micro-etching, welds show three layers, i. e., first layer inside, second layer (top outside) and third layer (bottom). The size of the various layers varies with the various welds. The effect of the etching agent differs with the heat treatment to which the plates were subjected.

In substituting a welded piece for one made up of castings, the following factors must be considered: Relative availability of plate and of castings, possession of own foundry or of well-organized welding facilities, number of identical pieces to be made, availability of

Abstract of a paper entitled "What Is Being Done with Welding at Watertown Arsenal," presented at the Fall meeting of the American Welding Society, Cleveland, September 9 to 13.

scrap plate suitable for use, and urgency of completion.

When only one piece is required, the cost of patterns is a heavy factor. Cast iron costs about twice as much as plate and small pieces of scrap may be already on hand. Bosses can be made from scrap ends of round stock. Using a shape-cutting machine, the sections of the piece can be cut from plate and no machine work is required other than would be necessary on the casting. When in a hurry, a piece can be made very quickly. This statement is presented not as an accepted or proved method but as one with certain possibilities. So far, we have not found welded pieces to alter with age. Those made to date have been annealed, but it may be possible to omit this. No special precautions were taken in welding, and in future work the amount of weld will be reduced. At many points, tacking should suffice.

Fabrication in this way eliminates expensive patterns, possible loss of a casting, and saves appreciably on cost of material. These more than balance the assembly and welding. If the pattern cost is spread over a number of castings, saving in cost would depend, of course, on the amount that can be saved in buying plate as offset by cost of fabrication.

In point of time, for a small number of units, fabrication is quicker, as materials can be procured before completion of drawings whereas little can be done even on patterns until drawings are complete. In this as in other cases, however, the conditions at each shop, and sources of material must finally determine in which method economy lies.

Torch-Cutting Steel Parts to Replace Castings

By W. J. Buchanan
Cooper-Bessemer Company

A LITTLE over a year ago an installation of a shape-cutting machine was considered for our plant at Grove City, Pa. After trying hard to figure where it could be used, we found three jobs that we thought could be handled more cheaply by the machine than by our present method. The shape-cutting machine was installed and for more than two months, it was in the novelty class doing only a few minor jobs.

Before very long our engineering department found what could be done with it, and the machine in all eyes changed so that they started to regard it in the same light as any other production machine. When any new work was being planned, the oxy-acetylene shape-cutting machine was considered. In this way, they soon had a large amount of production work lined up, and switched some of their regular work to the welding department. The machine is so busy now that a second machine will be needed for our heavier work.

Our work at present is the cutting of all irregular shapes from rolled steel stock and forgings. It would be somewhat difficult to fabricate parts for the building of Diesel engines by machining. The work which has been assigned to this machine has shown such a large saving that at present it is busy twelve hours a day and still cannot keep up with our demand.

One use of this machine that does not look like a money saver is the building of one part to take the place of a broken machine part. This work is done by making a one-time template, cutting the piece, and then fabricating it by welding. The saving on this type of work is the short length of time necessary to make the new part by the use of the shape-cutting machine as against the making of a pattern, casting the part in the foundry, and the machining necessary after the casting has been made. On the majority of replacements of this type where any change is to be made in the casting, the time saving amounts to more than a day's labor, and the loss of time in the use of the machine is also a day.

The biggest factor in doing light types of work is that the amount of machining necessary to finish the job is reduced to a minimum. This is because it is now possible to cut with such a degree of accuracy that a light finishing cut will finish the part. A good example of this is in the case of flat gears. Instead of cutting a piece of cold-rolled steel bar, we are now cutting round blanks out of a flat plate; the plate is finished enough so that it is unnecessary to make a facing cut on both sides, which reduces the amount of machining to boring the gear and a light sizing cut before the blank is put in the gear hobber.

Tooling a shop has always been a very costly and non-productive job. On this, we have shown our greatest saving. It is our practice now to make all jigs and fixture bases out of steel plate cut by the shape-cutting machine. This work can be done at a cost in some cases lower than we had to charge formerly for the making of the pattern, and the resultant tools are stronger than the former cast bases.

The future of machine cutting with the oxy-acelylene flame lies in its adoption by manufacturing firms for routine work. Parts can be cut out on the cutting machine and joined by welding. The simplicity of making from steel plate, parts which, if made by machining and drilling would take twice the time and many times the expense can be seen easily.

The confidence with which people look upon work which the shape-cutting machine turns out can be seen in this example. For many years the railroads have been cutting out side-rods and connecting-rods from heavy steel by means of the oxy-acetylene shape-cutting machine. When we realize that the railroads take the production of many of these machines every year in making up side-rods and connecting-rods, we must realize that they are not doing this without having a great deal of confidence in the reliability of the material cut on the machine. It is plain to see that the metal is not harmed in any way and that no strength is lost.

The matter of waste is also covered in this method of manufacture, since it is easy to see that every possible piece is used up. A circle is perhaps the most wasteful piece which could be selected. Square or rectangular

Abstract of a paper entitled "Cutting and Welding Steel Parts to Replace Castings," presented at the Fall meeting of the American Welding Society, Cleveland, September 9 to 13.

pieces will fit one into the other, and irregular shapes such as cams or governor weights would also fit into one another in such a way that there would be less waste. But, on the shape-cutting machine, even with the circle, the waste is cut down to almost nothing. The sides of one circle touch the sides of the next, and the steel in between is kept in just one piece. This is helpful in getting rid of the scrap.

With reference to preheating, on forgings such as a gear-blank, the hot metal is brought to the shape-cutting machine directly from the forge. It is then at a temperature of about 1,000 deg. F., which is the proper temperature for cutting. This preheating prevents any expansion and contraction stresses.

Any kind of steel, regardless of chemical composition, can be cut on the shape-cutting machine without harmful effect if it is properly preheated before cutting and properly heat-treated afterwards. By heating, a saving of labor and material can be made, for hot steel can be cut more quickly with the blowpipe. In this way, the amount of gas can be cut down and also the time of the man operating the machine.

After the cutting has been completed, parts can be heat-treated. Most steel parts will be benefited by this process. High-tensile steels such as nickel, chrome, and vanadium alloys gain greater tensile strength and better physical properties through proper heat treatment.

In steel mills, after the metal is rolled or forged, it is heat-treated to give it strength and the best possible physical properties. This prevents setting up strains in the metal by rapid or uneven cooling or by the changes in the structure of the metal on account of the working it receives in the forging or rolling process. In using the shape-cutting machine, we are making use of another hot-working process, so we should heat-treat to relieve any possible strains set up. In some cases, the material upon which we are working may already have some unrelieved stresses from its manufacturing processes.

In heat treatment, the steel is brought to a temperature a little higher than the upper critical point and kept at this temperature long enough to make it of equal quality throughout. Then it is cooled slowly, so that when it is cold it will have the best physical properties for general use. Sudden cooling of pieces should be avoided, so whenever there is any way to anneal or normalize the part which is being cut on the machine, it should be done.

Templets made of aluminum can be either permanent or temporary. The permanent ones are fastened to a sheet of steel with brass rivets.

For cutting out a small number of parts, temporary templets are more satisfactory than guiding the blowpipe by hand or guiding the machine by hand, since upon the completion of the job it will be found that all pieces produced from the temporary templet will be even and uniform. When several different cuts are made by hand, there is a chance of the edge of the cut being ragged and the outline of the shape of the part being different on the several pieces.

Temporary templets are made by fastening the aluminum strip to a piece of wood by putting small tacks on either side of it. These are used when only a few parts are to be made by shape cutting, as in the case of making up a replacement part for a machine.

At the present time, we have over 50 jobs listed as regular production work to be handled by the shape cutter. These are only a starter, and before another year is over, these should jump to 150 or more. Every day, we are finding new work that can be done quicker and cheaper by the shape-cutting machine than by any other method.

Equipment for the Car Repair Shop

By E. S. Behen, G. Reichert, and J. T. Jones

Committee on Tools and Equipment for the Car Repair Shop, American Railway Tool Foremen's Association

CAR repair costs have been reduced extensively on the railroads in the past several years, and among the items which contributed to this reduced cost, various tools and machines can claim a large share of the credit. The efficiency of the toolroom employees in maintaining and supplying the tools properly also plays an important part in reducing this cost. The care of pneumatic tools has been handled on a great many railroads by repairing the tools at one point, which in itself effects quite a saving in spare part expense.

The different types of work that can be done on a bulldozer should not be overlooked. The old style blacksmith shop where everything was hammered is gradually giving way to machine-made forgings, which, by the way, are much neater looking, and, contrary to the belief of some conservative blacksmiths, are much better forgings. With a few changes in clamping methods on bulldozers, a great number of forgings can be stamped, such as truck hangers, safety chain clevises, wrenches ordinarily used around the car yard and shop, and a number of other forgings now being made by hand.

Another very important phase of the car shop with which the tool foreman should familiarize himself is the selection of drills. Not only should he consider the length of the drills which will be required, but he should see that they will hold the cutting edge of high-speed drills and still retail the toughness of carbon drills. The drill breakage on car work is naturally greater than that on locomotives because accuracy is not so necessary, and it follows that the care given to securing proper motors will not be as exacting. The tolerances on foundation brake gear are being reduced constantly and to meet this condition all brake connection pins, truck lever pins, and brake hanger pins are being turned and case hardened, and all levers and rods are being bushed.

The most commonly used tools on car repair work are cold chisels. It is important, therefore, that chisels be made of a good grade of steel and that proper care be exercised in fabricating and heat-treating them. Many cold chisels now are being made of semi-high-speed steel. The service obtained is worth the additional cost of this steel over common tool steel.

Abstract of a committee report presented at the annual meeting of the American Railway Tool Foremen's Association, held Sept. 11 to 13 at Chicago.

Recently, high-frequency electric tools for car repair work have been introduced on many railroads, resulting in savings in labor as well as in drills and reamer bits over the bits used in pneumatic tools. In a recent test made by the Milwaukee Railroad, it was found that drills and reamer bits used in high-frequency tools gave longer service and caused less breakage. This is due to the steady, uniform pull obtained in the electric tools. Electric power cost is also materially lower than the cost of compressed air for pneumatic tools.

Another phase of the car shop that has been overlooked by the tool foreman is the cut journal evil and the expense that results therefrom. At the A.R.A. convention of 1928 a wheel and axle manual was agreed upon. The tools necessary to turn a good smooth journal should without a doubt be taken care of by someone who is thoroughly experienced in the grinding of tools. These tools are made with a radius to conform to A.R.A. standards and they should be gaged while being ground. Care should also be exercised in the grinding of boring mill cutters as to length and width of cutting edge, and this cannot be done accurately by hand. The A.R.A. has also ruled that all car brasses shall be either broached or bored before application. Jigs for holding the different size brasses can be made to use on shapers, and cutters graduated in tenths of an inch from maximum to condemning limits. This method will be found to be much more economical than boring, and with ordinary care on the part of the operator of the machine, these cutters will last a long time.

Reclaiming Non-ferrous Scrap Metals

By Francis N. Flynn

Metallurgist, Milwaukee, Wisconsin

UNTIL about five years ago, much of the factory scrap, with little or no preliminary treatment, was sold to secondary-metal smelters. Of late years the factory salvage department has become an important part of the plant in reclaiming everything of value, and, incidentally does much of the work formerly done by the smelters. Like most good things, it is sometimes overdone, and much work is done at the factory with inexperienced men that could be done much better by experienced skilled labor at the custom smelting plants.

Employees of the salvage department collect the waste products in all departments at the source and in that way avoid much contamination. Every reasonable precaution is taken to keep the scrap clean. It is hand-sorted, cut, burned, magnetized, concentrated, separated, or compressed, as the case may be, preparatory for re-use in the plant or for selling to others.

Copper, tin, lead, zinc, aluminum, antimony, and nickel are the principal metals in automobile manufacturing. Large tonnages of copper and tin are used in the bronze foundry, copper and aluminum in the aluminum bronze foundry, yellow brass strip and solder in the radiator department, tin in the babbitt department, antimony and lead in the battery department, and copper wire for electrical parts.

The manufacturers' aim is to re-use the clean scrap by the simple process of melting rather than smelting. Most of this work is carried out in the foundries on the night shift to avoid interference with production work on the day shift. The kettles or furnaces that are used for making production castings are used for melting the reclaimed scrap metals. The capacity of the kettles varies from 1 to 20 tons, whereas that of the melting furnaces varies from ½ to 1 ton. The melted scrap is poured into pig molds for re-use when and as required.

Not all of the scrap is melted; much is sold as collected, because there is no use for it in the foundries. There is a surplus of wrought yellow brass chips and borings, which if clean, bring a high price in the market. Chunk brass is not melted to pig but, because of the quantity used, it is advisable to melt and pig all borings of a copper-base alloy.

Larger foundries find it more convenient to smelt a portion of their scrap than sell it. This applies mainly to the concentrate and metal from the foundry cleanings and ladle shells. A pig-iron melting cupola is used. After smelting for 8 hours, the bottom is dropped, the fireclay blocks are repaired, and the furnace made ready for smelting another class of metal on the following morning. One furnace is used exclusively for lead. The charge consists of reclaimed metal from various alloys, usually a different alloy each day. The slags produced are remarkably clean in metal in chemically combined state; such loss as occurs is in metal prills. The lead slags show about 11 per cent alumina and 9 per cent iron oxide. The aluminum bronze charge contains slag resulting from the firebrick lining of the aluminum bronze melting furnace, together with oxidized metal from those furnaces. When smelted in a brick-lined cupola, the cupola slag shows up to 50 per cent alumina. Whatever iron is present is carried into the metal by the aluminum. This charge could not be smelted by itself in a water-jacketed cupola because of the high alumina and the absence of iron. The red and yellow brass slags show less than 5 per cent iron oxide. The brick-lined cupola demands a slag low in iron oxide and high in lime with part of the limerock replaced by fluorspar. The red and yellow brass metal contains less than 0.10 per cent iron. When used with virgin metal, it makes good castings.

The advantages gained by smelting in a brick-lined cupola over a water-jacketed cupola are:

(1) many hours are saved in warming up the furnace preparatory to smelting; (2) the brass-foundry workmen are more familiar with the operation of a pig-iron melting furnace than with a water-jacketed cupola; (3) slags can be made practically free from iron and high in alumina; (4) metal can be made lower in iron, a most important consideration; (5) a furnace campaign lasts one shift instead of a week or more.

The only disadvantage is the patching of the firebrick lining after each run. Two men can patch a furnace and charge the kindling and coke bed on one shift.

Abstract of a paper presented at the Cleveland Meeting of the Institute of Metals Division, American Institute of Mining and Metallurgical Engineers, September 9 to 13.

Hardness Distribution Produced by Cold Working

By W. P. SYKES AND A. C. ELLSWORTH

Metallurgical Engineer, General Electric Company — *Thompson Products Company*

IN A recent study of the relation between degree of cold working and annealing temperatures of iron-tungsten alloys, the location of the tested section relative to the surface of the worked metal appeared from the start to be an important factor.

It is obvious that the shape and dimensions of the material must be considered as important factors in determining the hardness throughout the cold-worked section. The present study is concerned only with round sections cut from rods reduced by cold swaging from a fixed starting diameter. The starting diameter is obviously a factor to be considered in the distribution of hardness throughout the cold-worked section. Additional variables are to be found in the physical properties of the metal under observation. These would include hardness, ductility and other properties which might be determined individually.

Copper, Armco ingot iron, and a carbon-free alloy of iron with 8 per cent tungsten were selected for this investigation. In the annealed condition these metals cover a moderately wide range in hardness. The Brinell hardness numbers of these materials before cold working were as follows: copper 50, Armco iron 80, iron-tungsten 120.

An iron-tungsten alloy containing 8 per cent tungsten is not subject to the alpha-gamma change upon cooling. Moreover all of the tungsten present remains in solid solution during the cooling from an elevated temperature. Hence the cooling rate has no influence upon the hardness of this material.

The tested sections were cold swaged to a total reduction of 25 per cent. After this amount of cold swaging, the Rockwell "B" hardness number has been raised by 77 points in the case of copper. The Armco iron has increased 48 points and the iron-tungsten 30 points. Of this total increase in hardness a large part has already been brought about during the first 3 per cent reduction. Expressed in percentages of total increase the figures at 3 per cent are as follows: copper 65, Armco iron 71, and iron-tungsten 90.

While the iron-tungsten, originally the hardest material, was numerically hardened least by 25 per cent reduction, yet the greater part of the hardening took place during the first step in the swaging operation.

The iron of 0.500 inch starting diameter, after 25 per cent reduction, developed a hardness which was practically uniform throughout the section. The copper of the same dimensions and after an equal reduction, was noticeably softer at the center than near the surface. The difference was even more noticeable after only 13 per cent reduction.

In some cases, the hardness of the outer section was slightly less than that of the center. This was especially true of the material which had been more severely worked.

The difference in hardness between the center and the surface after a given reduction by cold swaging must be determined by the diameter as well as by the physical properties of the material.

The iron-tungsten alloy shows the least difference of the three materials of large diameter after a 3 per cent reduction, while in the copper the attainment of a uniform hardness proceeds most slowly.

To ascertain the effect of the amount of reduction per die three sets of Armco iron rods were swaged by drafts of 3, 7, and 13 per cent respectively.

The resulting hardness measurements taken throughout the sections show too many inconsistencies to warrant any conclusion. The low hardness throughout the section in the case of the iron reduced 25 per cent by 12-13 per cent draft is difficult to explain. These particular rods were not swaged at the same time as the others in this group and possibly the dies may have been heated previously by other hot swaging operations. Aside from this, there is good agreement between the hardness values in the center sections for all three drafts. Rods of a larger starting diameter might perhaps furnish data of a more positive nature in a study of this factor.

A study of the distribution of tensile strength in hard drawn copper wire has been reported by Harris. In this investigation various types of copper rod and hard drawn wire were treated with nitric acid in such a manner as to remove successive layers of metal from the surface. The treated material was then tested for tensile strength. The author of this report includes the following paragraph among his conclusions:

"The results of the experiments show that the strength of hard drawn wire and commercial hot-rolled rod is by no means constant throughout the section. The 'skin' of the wire is, in general, below the average of the whole. There appears to be a point of low strength at the axis, but the method of testing adopted does not permit complete exploration of this area. The region of the highest strength appears to be in a zone near the core. Commercial hot-rolled rod shows a variance of strength throughout the section, being lowest at the outer zone and highest at, or near the core. Annealed rod, however, is almost uniform throughout. The effect of one draft on commercial soft copper is to raise the strength of the 'skin' above the average for the whole wire. Further drafts bring about the same conditions as before."

It seems likely that the method of working will be an additional factor in determining the distribution of hardness and tensile strength throughout the section.

Of the three metals observed, that of original greatest hardness increased the least numerically in hardness during a reduction of 25 per cent by cold swaging. The greater part of this hardening occurred during the first 3 per cent reduction.

The smaller the original diameter of the swaged rod the less the reduction required to produce uniform hardness throughout.

Uniform hardness throughout is more rapidly developed in a hard material than in a soft one. The factor of draft, within the range observed, is less important than certain other conditions of working.

In any analysis of hardness distribution throughout the section of a worked metal, it is necessary to recognize the effect of the heat developed during the process of deformation.

Abstract of a paper entitled "On the Distribution of Hardness Produced by Cold Working," presented at the Fall meeting of the A.S.S.T., Cleveland, September 9 to 13.

· BOOK · REVIEWS ·

INTERNAL COMBUSTION ENGINES. *By Robert L. Streeter and Lester Clyde Lichty. Four hundred forty-five pages, 6x9 in. Cloth boards. Published by the McGraw-Hill Book Company, Inc., 370 Seventh Ave., New York, N. Y. Price $4.*

IN THIS, the ninth edition of a well-known textbook covering the theory and design of internal combustion engines, the authors have eliminated much descriptive material in favor of a more extended treatment of underlying principles. Chapters added deal with lubrication, valves and their operating mechanism, balance, and vibration. Other chapters, especially those on liquid fuels and detonation, have been revised to eliminate obsolete material and include new data.

Because of the greater interest in liquid fuel engines in the automotive classes, these types are given more attention and gas engines less attention, although portions dealing with design are changed but little. Only those parts of thermodynamics which are regarded as essential to a clear understanding of the theory of internal combustion engines are included, for it is assumed that the reader will have a knowledge of this subject.

Illustrations are chiefly line drawings or graphical charts. They include sectional views of several modern engines and engine parts, and add materially to the value of the book.

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FOUNDRY PRACTICE. *By R. H. Palmer. Four hundred fifty 5½x8-in. pages. Cloth board covers. Indexed. Published by John Wiley & Sons, Inc.,* 440 *4th Ave., New York, N. Y. Price* $3.50.

THIS is a rewritten and enlarged edition of a well-known and authoritative book. It was originally written as a textbook, but in its present form it makes an excellent manual for any engineer or shop man who wants an insight into the workings of the foundry.

The volume is well illustrated with line drawings and halftones. It begins with descriptions of molds and molding, giving various practical examples, and then takes up progressively the subjects of cores, gates and gating, treatment of castings, molding machines, molding tools, sands, irons of various compositions, the cupola, and the air furnace. Much useful foundry information is given in the appendix.

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HOW TO TURN PEOPLE INTO GOLD. *By Kenneth M. Goode. Two hundred twenty-nine pages, 5½x8½ in. Cloth board covers. Published by Harper & Brothers, 49 East Thirty-third St., New York. Price $3.50.*

A TIMELY and thought-provoking discussion of the ordinarily trite subject—the dilemma of business—this book attacks the problem from the point of view of the executive attempting to increase profits by decreasing waste. Several striking claims are made by the author, among them those that our present-day selling strategy dates back to the War of 1812, that American business men think backwards, and that a study has revealed that at least $10,000,000,000, more than our imports and exports put together, is unnecessarily wasted each year in American business.

The author claims further that while the top half of the American population has a comfortable income and excellent buying power, the bottom half still lives below the minimum budget for health and decency, that speculators are piling up money taken from the hands of the people, and that there is no future for the man over 50. Even a casual survey will reveal that there is plenty of room for controversy on any of these claims. The author uses excellent examples to strengthen his side of the question, and succeeds in presenting an extremely up-to-date argument. All-in-all, the book is a well-written discussion of a controversial subject, and one that will prove interesting to the average executive.

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HUMAN NATURE AND MANAGEMENT. *By Ordway Tead, lecturer in personnel administration, Columbia University. Three hundred and twelve 8x5-in. pages. Indexed. Published by the McGraw-Hill Book Company, Inc., 370 Seventh Ave., New York, N. Y. Price $3.50.*

HOW to use psychology in managerial work is the keynote of this book, which, after reviewing the principles of interest to executives, gives some real help in the form of suggestions garnered from progressive managers for the use of those who have to deal with people. And it does not neglect the improvement of the executive himself, for material is included that is calculated to give him a better grasp of his own desires, thus affording him means of ordering his mind as a conduct-controlling instrument.

The points of view and the methods advocated are equally applicable in all types of organizations where people must work under leadership. In short, the author has produced a thoroughly practical work through which the executive can learn to formulated his own innate desires into definite policies that will gain the co-operation of his subordinates, and which affords him a means of understanding the behavior of a single person or of masses of people.

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COMMERCE YEARBOOK, VOL. I, UNITED STATES. *Seven hundred and twenty, 6x9-in. pages, Buckram covers. Indexed. Published by the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C. and procurable from the Government Printing Office, Washington, D. C. Price $1.*

THIS seventh annual issue of the Commerce Yearbook follows the lines of previous years, but is enlarged and improved in many respects. It contains detailed information concerning business conditions in the United States and possessions. It assembles under one cover the statistical information which is collected by numerous government bureaus, together with data from trade associations and trade journals.

Typical subject headings in the book are: Movements of Production and Domestic Trade; Economic Position and Progress; Wholesale, Retail, and Farm Prices; Foreign Trade; Iron and Steel; Automotive Products, and Banking and Finance. No business library is complete without this official volume, which summerizes and analyzes in convenient form the original data on a wide variety of economic subjects.

Forging Tools *for* Rod Bushings

By Frank W. Curtis

Bushings for locomotive connecting rods are made in this shop from axle steel hot-forged on a hydraulic press

A METHOD of forging locomotive main-rod bushings has been developed at the San Bernardino, Calif., shops of the Atchison, Topeka and Santa Fe Railway system where the majority of connecting rods for West Coast motive-power are built and repaired. The bushings are used in connection with the floating-type rods that are being so universally applied to the larger types of locomotives.

A general layout of the processes is illustrated in Fig. 1. The tools shown are for making the bushing illustrated at *A*. Tools for other sizes of bushings are made proportionately, and the principles of construction are the same. A feature of the method is that the billets, from which the bushings are made, are cut from discarded driving pins and axles. The physical analysis of the steel used for these parts is ideal for bushings, so that the process has made possible a considerable saving in material.

A blank for bushing *A* is shown at *B*, while at *C* is illustrated the general portions after it has been heated and squeezed to the proper working size.

With the blank in this form, the first operation is the piercing of a 7-in. hole through the center, as shown at *D*, which is done in the die shown at *E*. The blank fits into the opening of the die, and is supported at the lower end by a die bushing, which has an opening through which the pierced slug passes. A guide plate, made in the form of a ring, is placed on the top face of the work for supporting and lining-

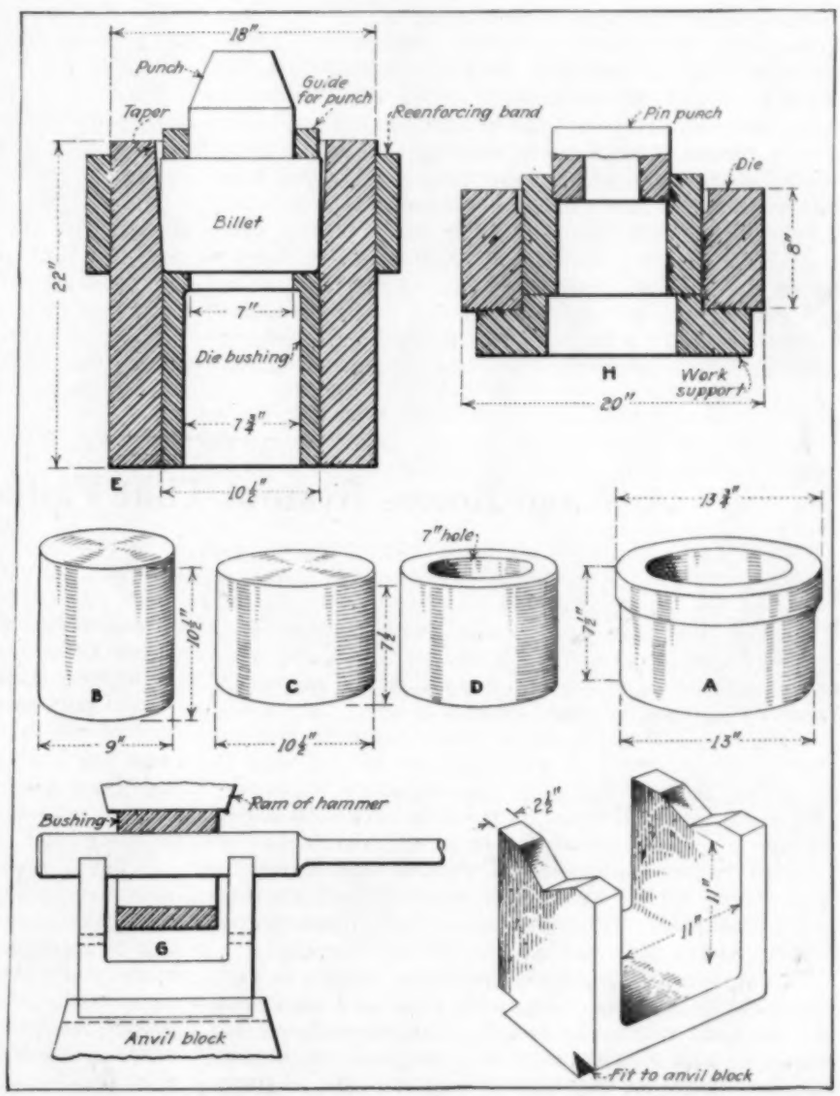
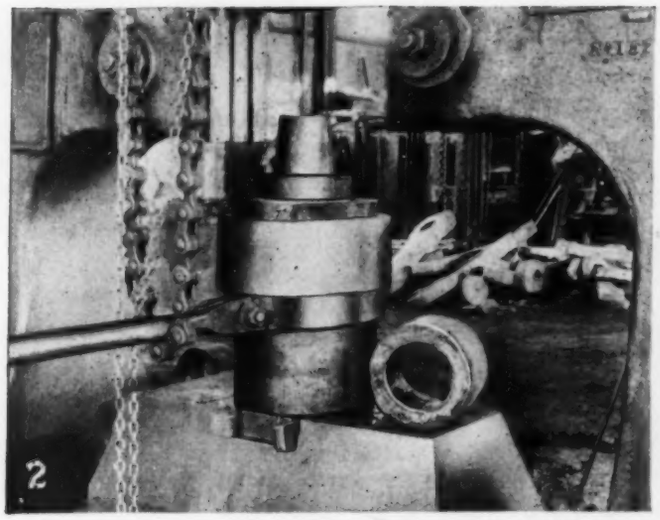


Fig. 1—Tools used in forging bushings for the floating connecting rod bearings. The operations include piercing, rolling, flanging and sizing. The bushing requires a minimum of machining



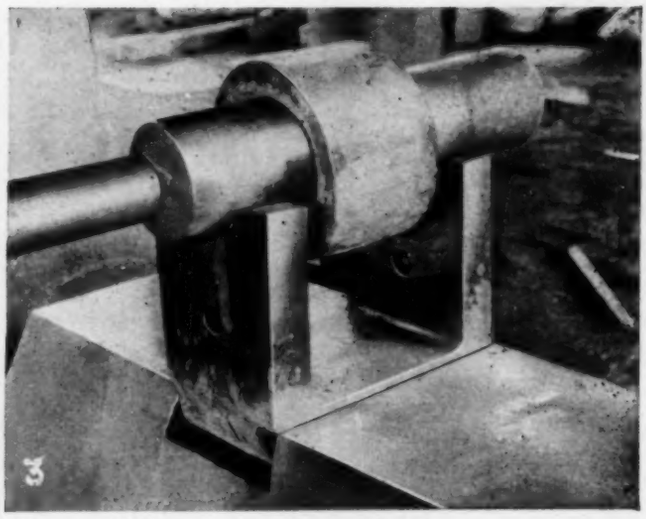


Fig. 2—Piercing die set up in the hammer, preparatory to piercing the blank. At the right may be seen a bushing after it has been pierced. Fig. 3—The anvil for the rolling tool is made to fit in the anvil block. It has two V-block ends on which the supporting bar rests

up the punch preparatory to forcing it through the blanks. The blank is heated to approximately 1,800 deg. F. so that the punch can be easily pushed through. The side-wall of the die is made with a slight taper to aid in the removal of the pierced forging.

As a second operation, the bushing is reheated to a forging temperature and is hammered in the sizing tool illustrated at *G*. The operation is termed "rolling," and is done by hammering the bushing on a mandrel that is supported on two V-blocks and revolved to suit. Turning of the bar rotates the bushing, so that the entire wall surface can be hammered to size. The operation reduces the wall thickness of the bushing and increases the length and outside diameter until the desired dimensions are obtained.

The final operation is the sizing of the diameter and the forming of the head, which is done in the die illustrated at *H*. After it has been heated, the bushing is placed in a ring die. A punch is forced into it, to support the inside, and the flange is then formed. A work support is placed under the die and has an opening in it to permit the punch to pass through.

The piercing die, set up in a 4,000-lb. hammer, is illustrated in Fig. 2. The rolling tools in the hammer, ready for use, are illustrated in Fig. 3. The headpiece illustrates a number of forged bushings ready for machining, as they are turned over to the stores department.

The process has worked out so sucessfully for connecting-rod bushings, that it is being developed for other classes of work.

A Wage Bonus System That Failed—*Discussion*

By Rupert E. Knox
Canadian General Electric Company, Ltd.

I HAVE just read Tom Blair's article on page 270, Vol. 71, of the *American Machinist,* and I note that he does not agree with P. H. Bryant, on the subject of "A Wage Bonus System That Failed."

I read Mr. Bryant's article, and I consider that he covered the subject very thoroughly as to just what is happening in every day shop practice, and I would like very much to see or know of a system that would cover putting just such work as this on an incentive basis.

Since the time I was with Dr. Frederick W. Taylor, in Watertown, 1911, I have not been able to find a system that backs up Mr. Blair's contention, that anyone can put a bonus to any degree of accuracy on storekeeping.

I have installed piecework and bonus systems in various factories, and know something of what I am talking about. Such systems as Mr. Blair mentions have often been sold to executives who have not had the time to look into just what they were buying, and have taken the word of some bright engineer that work of this nature can be put on an incentive basis.

While I am at all times for piecework, or work on any incentive basis, where it is practical, I am absolutely not selling any company a "gold brick" in the manner of putting this class of work on an incentive basis.

Mr. Blair says that the failures can be placed at the door of the management. I agree that if the management had provided the proper supervision in tool work, and the storekeeping work, it would have received just as good results, as was claimed to have been made on an incentive basis.

While a saving of $10,000 in a half year on some operations is not very high, still it seems to me something must have been radically wrong under the day work system of management, to be able to make this reduction in the storeroom. I would say that the sooner we can come to the conclusion that we have not yet found the proper methods of applying wage incentives to non-productive workers, the sooner we will arrive at a solution, for we are certainly only fooling ourselves when we try to estimate the time on this class of work, where we all know it is extremely difficult to do so. Something for nothing is not an incentive.

PROGRESS IN MATERIALS

AT THE METALS EXPOSITION

By GEORGE S. BRADY
Associate Editor, American Machinist

Infinite possibilities in metal combinations are producing an "Alloy Age," to give the designer and production man any desired result in raw materials for product and tools.

AN "ALLOY AGE," as a fitting materials accompaniment to the requirements of this era of automatic machinery, in contradistinction to the fading age of ordinary iron and steel, was the keynote of the National Metals Congress, held in Cleveland from September 9 to 13. Alloys for many uses were featured, the outstanding classes being high-speed cutting alloys, corrosion-resistant steels and irons, high-tensile light alloys, high-test irons, die-casting metals, alloy welding rods, and a wide range of alloy tool steels to give almost any desired property.

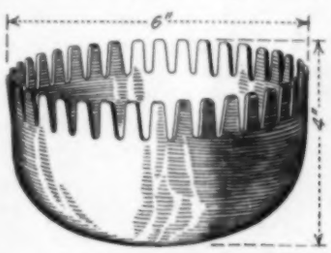
Tungsten, chromium, nickel, cobalt, vanadium, and manganese are the chief metals that are taking a prominent place in the building up of an almost unlimited number of alloy irons and steels where such factors as hardness, wear-resistance, corrosion-resistance, extreme tensile strength, or heat-resistance, can be called for at will by the designer. In like manner nickel, copper, manganese, silicon, and a few other elements are helping to produce very light-weight alloys with aluminum and magnesium, these alloys having even higher tensile strengths than could be obtained in the best steels of a few years ago. It was also brought out forcibly to the visiting engineer at the Show how careful heat-treatment with proper equipment will also vary and improve the physical properties of almost all of the alloys within such controllable limits that they can be specified in the design of the product.

Cast-iron has undergone remarkable improvements within a short period of time. The cause of this has been attributed to the competition of welded construction, but it is more likely that the iron foundry is simply keeping pace with the general modernization in plant and product that has affected all mechanical industries. The improvements in gray iron have resulted from better technique and from alloying with nickel, chromium, silicon, and other elements. Resulting iron castings show properties of soundness, wear-resistance, and toughness, which were previously only obtained with great cost and difficulty in the very best malleable irons. The Gray Iron Institute featured at the Show alloy irons and "high-test" irons in very light-sectioned castings for light-machine parts, and wear-resistant alloy iron for such parts as automobile brake drums where the castings were effectively replacing sheet-metal parts on the second lap of the competitive race between sheet-metal and castings.

Mayari iron, which in addition to nickel and chromium, contains vanadium and tantalum, was shown in castings by the Bethlehem Steel Company. The Jewell Steel & Malleable Company featured alloy heat- and abrasive-resisting castings with Brinell hardness up to 600. A cast specimen of one grade of this "Jewell alloy," although similar to white iron in texture, was claimed to bend cold to an angle of 40 deg. before breaking.

The International Nickel Company is featuring the ease with which nickel and nickel-chromium can be added to iron in the foundry, especially by "shot" additions to the ladle. This method places the high-grade alloy irons within the reach of the average small machine-shop that has only ordinary foundry equipment and personnel. Nickel and nickel-chromium cast irons made in this way have increased hardness and toughness and are freer from imperfections. They are used for all kinds of cast machine parts.

Ingot irons made by the basic open-hearth process have gained greatly in favor within a comparatively short time, but that they have not yet driven from the market the older puddled charcoal iron is evidenced by the recent introduction of "Swedelec," a Swedish charcoal iron, to the American market. It is being offered by A. Milne & Company for transformers, radio loud speakers, and for electrical core iron where high permeability and low hysteresis loss is essential. The Rustless Iron Corporation of America featured for the first time a line of rustless irons under the names Defirust, Defistain, and Defiheat. They are very low in carbon, usually less than 0.20 per cent, and contain from 12 to 30 per cent of chromium. The high-chromium, silicon grades are non-magnetic, have a tensile strength up to 80,000 lb. per sq.in., and will withstand scaling at high heats. They can be worked readily and machined. Another line of corrosion-resistant iron alloys was shown by the Duriron Company, Inc. under the name of Durimet. The nickel content goes as high as 35 per cent, and the silicon to 5 per cent with varying amounts of chromium. The irons are especially recommended for acid resistance. Actually, alloys such as Allegheny metal, containing less than 75 per cent of iron, are not true "iron."



This acid-resistant cap was drawn from ¼-in. high-chromium alloy steel formerly thought to be unworkable

In the "stainless steel" class machineability was featured in the free-turning nickel-chromium screw stock of the Carpenter Steel Company, and in the deep-drawing Enduro-Nirosta made in this country under Krupp patents. Along this latter line the Pressed Steel Company showed some remarkable feats in deep-drawing, bending, and rolling Rezistal, Ascoloy, and Allegheny metal. The latter metal was being featured at the Show by Joseph T. Ryerson & Son, Inc., as a super-corrosion-resistant metal. This same company is also bringing out a grade of free-turning high-manganese steel screw stock that, when heat-treated, has a tensile strength up to 130,000 lb. per sq.in., with elongation of 21 per cent, and Brinell hardness of 200.

A "Cleveland Plain Dealer" cartoonist's conception of the high quality of the data now being given in steel and metals catalogs

The Carpenter Steel Company displayed a line of carbon tool steels under the mark "Diok," which stamp signifies "Disk inspected O.K." These steels are acid-tested in every billet, and every bar of a given grade is claimed to be uniform with other bars of the same grade giving uniformity in the physical properties of the finished product over a wide hardening range of about 200 deg. F. The Edgar Allen Steel Company is offering a new super-high-speed steel made in the high-frequency electric furnace and sold under the trade name of Imperial Major. A 1-in. drill made of this steel drilled 10 holes in hard 13-per cent manganese steel after which a $\frac{1}{32}$-in. grind gave a new perfect cutting edge. A total of 257 $1\frac{1}{8}$-in. holes were drilled in the webs of manganese steel rails with one grind of the drill. A chisel steel being introduced by this company from England under the name of Minerva was shown to give excellent results in large punches for blanking heavy high-silicon steel plate. It is an oil-hardening alloy steel. Another new chisel steel adapted for shear blades, shock-resisting tools, and set screws is "Jessop's O.K." shown by William Jessop & Sons, Ltd. It comes in round, flat, oval, square, and octagon sections. The same company was also featuring a new high-carbon chrome-molybdenum steel, "Albor," intended for dies for cold stamping hard and tough metals such as those used in jewelry manufacturing. The Morse Twist Drill & Machine Company showed "Circle C" cobalt-steel drills and cutters for machining high-manganese steels. Only a short time ago both high-silicon and high-manganese steels were considered unmachineable. A new offering in tool steels is the "Colhed" brand of the Vanadium-Alloys Steel Company. It is a carbon vanadium steel adapted especially for cold heading dies. It is claimed to harden to a sufficient depth so that the impression will not sink and to be tough enough to prevent chipping.

The Electric Steel Founders' Research Group had a combined exhibit of steel castings by "competitors who have co-operated to improve quality." The exhibit included gears, a chuck body, and various other machine parts made with great uniformity in electric cast-steel. One example of a cast-steel gear shown by the Sivyer Steel Casting Company to supersede a cast-iron gear showed a weight of 68 lb. as compared with the former weight of 88 lb. in iron with added strength and longer life.

One of the new oddities in steel is the iron fibred steel of Edgar Allen & Company, Ltd. It is a steel with strands of iron wire meshed into it. It is claimed to possess the strength of steel with the toughness of iron, and it is used for draw bars, coupling links, and wedge and header bolts. Another curiosity of real practical value was a seamless tube of tool steel 0.020 in. in diameter made in a 75-ft. length shown by the Ellwood Ivins' Tube Works. It indicates the practicability of seamless tubing in any small size. Copper tubes have been made by this company for instrument work with a hole 0.020 in. in diameter up to 40 ft. long.

Welding rods are receiving very specialized attention, and several companies exhibited new types of alloy rods, coated and uncoated. It is now considered as important to have just the right type of rod for the particular work as it is to see that the other welding factors are correct. Besides the rods of various tensile strengths, alloy contents, and expansion factors, rods are also offered for beading and building up hard or wear-resistant surfaces on metal parts. "Niclad," being offered by the Flannery Manufacturing Company for cyaniding and annealing pots is a steel jacketed with pure nickel on the outside.

The "new cutting alloys" of tungsten-carbide, although no longer new, have not lost their original interest if it can be judged by the attention paid to the practical machine demonstrations at the booths of the Carboloy Company and Thomas Prosser & Son. Another brand is being placed on the market by the Firth-Sterling Steel Company under the name of Dimondite. The makers of Carboloy are now accenting the absolute necessity of rigid toolholders and ample backing-up of the tungsten-carbide bit by solid metal in order to obtain the best results in cutting with the tool. A new application of this material is in the lining, or bushing, of sandblast nozzles, where enormous increases in the length of life of the nozzles were thus obtained. Further developments with the carbides are to be expected in the near future. The Vanadium Corporation of America exhibited samples of carbides of vanadium, molybdenum, tantalum, zirconium, titanium, and chromium, all of which are extremely hard and have approximately similar possibilities for diffusion and binding into the so-called "alloys" as the tungsten-carbide. Incidentally, a paper read during the Show by Dr. S. L. Hoyt of the General Electric laboratories on the "Preparation of Microsections of Tungsten Carbide," went into some detail regarding the boron carbide

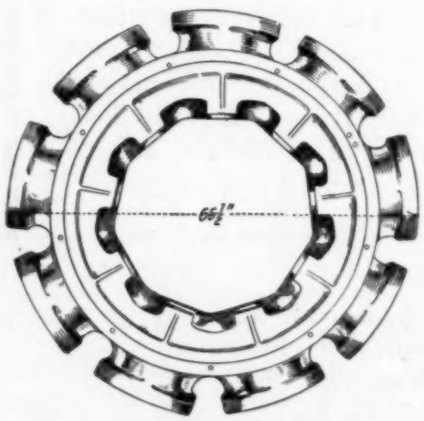
A "Niclad" heat-treating pot clad with nickel to prevent oxidation by furnace gases

now being produced by that company and finding use as an extremely hard abrasive and as a deoxidizing material for non-ferrous alloys.

A wide variety of die castings were exhibited by the New Jersey Zinc Company, among which were samples of automotive carburetor bodies, a recent design of radio loud speaker housing, and a new model of radio chassis. The use of zinc-base alloys for die-casting purposes is claimed to have increased five times in the last seven years. Contrary to the usual opinion, these alloys have high tensile strength, and their ease of casting into intricate shapes and fine threads, combined with the easy adherence of almost all finishes to parts made from them makes them suitable for a great variety of parts.

There is no single group of alloys that has more individual fascination at the present time than the high-strength light-weight alloys being produced from aluminum and magnesium. Tensile strengths up to 70,000 lb. per sq.in. have been obtained in heat-treated aluminum alloys such as the grade C17ST of the Aluminum Company of America, and these alloys are making possible the all-metal airplane and dirigible, the light-weight motor coach and railroad car, and now the light-weight structural frames for many uses. The general run of these alloys contains from 2 to 5 per cent of copper, with small amounts of manganese and magnesium, and sometimes silicon. The casting alloys for engine pistons, however, are high in magnesium. Actually, an almost infinite variety of alloys is possible using also nickel and other elements. The more recent light metal beryllium is being lowered in cost constantly, and from the results achieved in alloying with aluminum it is expected to take front rank eventually in the production of light alloys.

One feature of aluminum alloys pointed out by the Aluminum Company is that the so-called strong alloys are all wrought materials. While heat-treatment will produce very substantial improvement in the physical properties of the cast alloys of the same composition, the maximum improvement results only in the materials that have been worked sufficiently to destroy the cast structure of the alloy. All of the aluminum-alloy shapes now being offered on the market are therefore extruded and usually stretched afterwards. However, it is not to be assumed that the cast alloys are lacking in strength, since many of them greatly exceed the tensile strengths of the old machine steels, and their advantage lies in the possibilities for the production of complicated cored castings of almost any size in about one-third the weight of the same size of casting in steel or iron.



A large heat-treated aluminum casting of a Diesel-engine crankcase weighing 1,200 lb. The same crankcase in cast iron would weigh a ton more

Only about half a dozen years ago the metal beryllium cost at the rate of $5,000 a pound. It was produced later at a cost of about $50 a pound, and recent reports from Europe state that the Germans have reduced this cost to $10. The metal has a grayish-steel color, is harder than aluminum, and is much lighter in weight. The amount of beryllium being used in alloys at the present time is generally less than one per cent, but with this quantity very strong, hard, and tough aluminum alloys have been made. The Beryllium Corporation of America is behind much of the laboratory investigation of this metal.

Developments in brass and bronze brought out at the show were limited largely to welding rods. The American Brass Company exhibited copper-alloy and bronze rods for the welding of iron, steel, brass, bronze, and Monel metal. Bronze rods are being employed where welding with a steel rod would present the problems of opening of seams, or cracking and warping. The Tobin bronze rods of this company flow freely at 1,650 deg. F., and consequently are useful for repairing breaks on large machines where pre-heating is not possible because of the size.

Zinc-base die castings are increasing in use. This Radiola speaker is an example

This same company is announcing a new alloy metal to be known as Tempaloy. According to data given in one of the papers read at the meeting of the A.W.S., this alloy contains 3.2 per cent of nickel, 0.80 per cent of silicon, and the remainder copper. It therefore falls into the class of what has been called "high-strength brass," although such metals are not technically brasses. The nickel and silicon in these "brasses" are claimed to form a nickel silicide, increasing the strength, and making possible an increase in hardness by heat-treatment and aging as in some aluminum alloys. There is every reason to believe that there will be developed a new group of copper alloys distinct from the old brasses.

Chart Board for the Storeroom
Discussion

By Trevor Bonsall
Surrey, England

REFERRING to the article on page 562, Vol. 70, of the *American Machinist*, if Mr. Schwam could be in the position of a foreman in the machine shop whose material requisitions have just been returned marked "no stock," his opinion of the storeroom would not be very favorable. Such a board as he mentions does not indicate "no stock." It indicates that the supply system has broken down because someone has failed to function.

The shop foreman, at times, is asked to accomplish the apparently impossible, and only in exceptional circumstances will excuses be accepted in lieu of delivery. There is no more excuse for failure in the storeroom than in the shop. Imagine the nerves of a foreman who is building nacelles for airplanes, and having his output held up because of no stock. The experience of having slips returned so often, marked no stock, gives rise to the thought as to whether stockkeepers may not be fatalists, who believe that, "what is, will be, and nothing can change it."

The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions given at the foot of the page have been arranged

Paying for Dependability

"WHAT were you scrapping with Williams about this time, Al? Saw you having a great confab this morning. Trying to spring something new on the rest of us?" said Ed, at lunch one day.

"Nothing new, Ed. Same old question of how to play fair with the really good man who doesn't get a chance to shine on production."

"But it's production that counts, you know, Al. Why should Williams care about anything else? That's what the big boss is always riding him about—more production."

"Partly true, Ed. Of course we must have production. That's what we sell, and where our money comes from. But the number of pieces a man turns out doesn't always show how much he has earned for the company."

"I don't just get that, Al."

"Well, let's take the case of Jack Winters in my department. He's the man I'm trying to get a raise for. That's what I was talking to Williams about this morning."

"But he wasn't such a fast worker when he was in my department. I'd never pick him out for a raise. Just what was your reason, Al?"

"I'll tell you, Ed. As I read the other day, every man is penalized for the amount of bossing he requires. In other words, the less bossing a man needs the more he is worth to the company. And Jack Winters needs mightly little bossing. When I give him a job and blueprint I never have to think about the job again until it's done. And when it's done, it's done right. That's worth real money to the company, Ed."

"But we're paid to boss the men, Al. It's our job to watch them and see that the work goes right. If they were all like Jack Winters, we'd be out of a job. It's production that counts, as I said before."

"Of course, Ed. But that means quality as well as quantity. Did you ever know Jack to spoil a job? I never have. And it's worth real money to be able to know that a job you need in a hurry is coming through on time and is going to pass inspection. If we had more men like him we'd have less grief and so would Williams."

"But I don't see how you can pay a man more for doing a good job if he don't do more work."

"It's the net amount of good work that counts, Ed. And entirely aside from the amount of work I believe dependability is worth more recognition than it usually gets. We can count on Jack Winters every time. He doesn't turn up missing just when we need him most. He needs almost no bossing, and his work is right. If men like that don't deserve more money than men who have to be watched all the time, I miss my guess."

Is Al right in wanting to raise one of his men because of his dependability, and for his ability to go ahead with little or no bossing? Or is Ed right in saying that production only counts?

All foremen are urged to discuss these questions vital to their work; of course the

ROUND · TABLE

DISCUSSION OF EARLIER TOPICS

Paying for Dependability

AL BRINGS up an interesting point, and one that is frequently overlooked. Ed's contention that the foremen are paid to boss the men is, of course, true, but the work turned out by the man who takes a large amount of the foreman's time should be charged with a large amount of the foreman's salary in addition to the man's time.

Dependability is one of the most valuable assets in the shop, and it should be recognized in the pay envelope. Unfortunately, the wage increases too frequently go to the men who are persistently asking for a raise, while the dependable man is apt to be of the retiring kind.

—HENRY C. FRANKLIN.

*

Should Workers Buy Company Stock?

THE wave of prosperity that is being enjoyed by industry is creating a large number of small investors in stocks of all kinds. This, to my mind, is a great argument in favor of workers purchasing shares in the concern that employs them. It is obvious that the man who owns a share in the business will try to increase the value of his holdings, and many large concerns have been alive to this fact for years, notably the General Electric Company and the Western Electric Company. The method of buying varies, of course, but the majority favor the weekly plan. A compulsory plan is out of the question, but the average man needs no persuasion, for the advantages to him far outweigh the disadvantages. In one plant of which I know, building loans are granted to men using company stock as security.

—ROBERT S. ALEXANDER.

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Paying a Bonus for Temporary Work

MOST men prefer to work a certain number of hours every week, all of the time, and not, many hours some weeks and not at all other weeks. For this reason it is better to put on extra help when good men can be obtained. But good men are scarce and an inducement is necessary to get them to accept temporary employment. At the same time, men who work intermittently must draw higher wages when they are working to make up for the time they are out of work, as their living expenses go on just the same. The assurance that a man has a steady job and will not be laid off when any rush of work is over is worth something to the man. In this case he should be willing to work for less than if he is a temporary member of the force.

In almost every case where the extra men are paid more to work during the emergency, the old men become jealous of the higher wages of the new men. Sometimes this results in a demand for the same rate of pay. Since all of the force may be doing practically the same class of work, the old men may think that they are justified in making this demand. The situation should be carefuliy explained to them to show the reasons for, and the temporary life of, the seemingly unjust conditions.

If they should still insist in their demand and have to be placed on the same rating as the new men, their names should be placed on the list of newcomers. They should be told of this action and firmly informed that they would be laid off when the rush was over just the same as any of the men hired for the emergency.

—L. O. BROWN, *Toolroom Foreman, Holcomb and Hoke Manufacturing Company.*

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Oil Cups or Force Feed

STARTING on the perfectly sound premise that the open oil cup or oil hole with its dirt-catching bit of waste and its general inefficiency is a good thing to improve upon, I still think that there is no method which, in itself, guarantees perfect lubrication.

Sight-feed cups are not reliable, except under constant and close scrutiny, besides being cumbersome and difficult to fill. Force feed systems, while theoretically efficient in their combined cleansing and lubricating action, give no assurance that all leads are open and functioning.

All of which gets back to the thought, which I believe, even in this age of almost human mechanical devices, underlies all successful operations—careful, intelligent human supervision. —D. C. WRIGHT.

WATCHING oil cups while operating a machine tool means a hindrance to production. We production men know enough about "Christmas-tree ornaments" and we would be glad to have the machine toolmakers turn their attention to automatic oiling. It is easy to say that the worker should see that his oil is right and that the foreman should check the worker. Nevertheless, empty and clogged oil cups are the order of the day.

The construction of automobile and airplane motors shows that automatic oiling has attained a high degree of perfection. Furthermore, many builders furnish their machines with well-operating oiling equipment. They do so not only for the user's sake but also for their own reputation. For example, we have a machine in our shop built by a well known maker in the United States. The oiling system of that machine consists of an oil pump which forces the oil into an elevated oil reservoir. Before entering the distributing chamber the oil is filtered through a woolen bag which is placed over the opening of the return pipe, so that clean oil only is used. From this reservoir oil pipes of ½ in. inner diameter lead the oil by gravity over distributing plates in the interior of the machine. From these plates the oil flows freely to the different bearings. This ingenious arrangement avoids the usual long and small oil pipes. The pump

discussion is not limited to foremen. Letters accepted and published will be paid for

drive is positive and is used much below its capacity. I believe we could run this machine for several months without having to think about oil. It is considered our best tool. There is no idle time. We can count on its well protected mechanism every time. My foremen and the men under them would like to have only such machine tools in the shop.

—FRANZ BERMAN, *Supt. Locomotive Factory, Austrian Hungarian Licensed Railway, Vienna.*

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Stirring Up the Foremen on Accidents

ED IS WRONG in thinking that any accident is of little importance. Some time ago a machinist in our shop cut his thumb on a revolving chuck, just before quitting time. As the wound did not bleed much, he did not have it treated. Several days later the pain and swelling of the hand made the attention of a physician necessary, and when I saw him last he was still visiting a hospital for treatment.

From the firm's point of view, there was the fact that the lathe remained vacant about a fortnight. Then a temporary man was hired to get the work out. He left after a few weeks, and the lathe was again vacant. Therefore, it can hardly be said that the accident was of small importance, although at the time it appeared to be little more than a scratch. Prompt treatment would probably have meant no loss of time.

—A. F. GUYLER, *Nottingham, England.*

THE influence of the foreman on the observance of safety-first principles is essential in any plant. Speaking from experience as a first-aid man in a large plant, I remember how, at one period, the number of accidents gradually increased until it was keeping me busy patching up men and taking them to the hospital for treatment. The manager of the firm then tackled the job. The first thing he did was to post notices about the shop.

He had also an earnest talk with the foremen, and the results were gratifying. Each foreman began to take for his motto, "Prevention is better than cure." In line with this policy, chains were tested before lifting heavy machinery, and when in use, the foremen supervised slinging them in position. The men working down the bay were warned to stand clear as the crane with its load travelled down the shop. In a short time the number of accidents dropped to a low point.

—R. G. HEWITT, *Keighley, England.*

YEARS ago a man's experience at the machinist trade was sometimes estimated by the number of fingers he had missing. A real mechanic boasted of a couple of missing digits.

Williams has the right to be "all het up" over the accident to Jack Hart, although it is apparently trivial. Accidents are expensive to both employer and employee and sometimes disastrous to the employee's family. It is only by investigating every accident, and taking steps to prevent a recurrence, that accidents will be prevented. Al is right when he says: "You don't pay much attention to accidents until one happens to you." Williams is only trying to save the other men from what he wouldn't want to happen to himself, and should have the full co-operation of all the employees. —W. J. OWENS.

RESPONSIBILITY for the provision of safeguards lies with the employer, and responsibility for their use lies with both foremen and workmen. This applies not only to the guarding of moving parts, and to the regular testing and inspection of lifting tackle, parts under strain or moving at a high speed, but also to regulations as to the method of approaching moving parts, such as shafting and overhead belts, that, usually, need not be guarded.

When once the proper safeguards have been provided, the difficulty to be overcome is that their use may be a definite drag on production, and that the neglect to use them will be winked at by the foremen who are responsible for production. Foremen should be instructed to put safety before production, and should be required to report all cases where these two factors are in opposition. —H. J. BURNHAM.

* * * *

THE · NEXT · TOPIC

"Learning from the Small Shop"

Stirring Up Foremen on Accidents

SUMMARY OF THE DISCUSSION

One of the foremen failed to have a pulley guard replaced. A man slipped, and fell into it and broke his arm. Williams characterized the accident as being entirely avoidable. Ed thought that Williams was unnecessarily wrought up over an unimportant accident that the insurance company would pay for. Al contended that the damage in many respects went beyond that.

INTEREST in accident prevention was widespread. The opinion expressed ran along two general lines: some correspondents placed reliance in safety committees, while others maintained that safety was a matter of education and that the only cure for accidents lay in habitual safety mindedness.

Regardless of the method used, it was agreed that the foreman is the keystone. He must be held responsible for conditions within his department that cause or are likely to cause accidents, not because he is responsible for them, but because he can prevent them most effectively. One correspondent asserted that he had watched the gradual decline of the safety committee and the increasing responsibility of the foreman in safety work, and that the reduction in the number of serious accidents kept pace with this change.

An engineer stated that while management could lay down certain general rules, the foreman must add the personal touch. A foreman suggested that in guarding against one kind of accident, care should be exercised not to make possible a more serious one. As a specific instance he pointed out that the guards on the cone pulley of certain types of lathes were veritable finger traps.

Concerning

Some Curious Notions About

The Machinery Industry

By Ernest F. DuBrul

General Manager, National Machine Tool Builders' Association, Fellow of the Institute of Management

IN A radio speech on July 13, over the Columbia Broadcasting System, Senator King, of Utah, quoted with evident approval some of the fallacies expressed by André Siegfried in his book "America Becomes of Age." Apparently the Senator agrees with Mr. Siegfried, who has an old world and medieval idea of the delights of self-expression as expressed in handicraft production, and of the evils of machine production.

Senator King said that Mr. Siegfried refers to the fact that while the American workman may have a house, a bath, and a car, he fears that these possessions are obtained at a tragic price, no less than the transformation of millions of the workmen into mere automatons. He also pointed out that Mr. Siegfried calls attention to some faults of American industry, an industry built on the standardization of the workmen themselves. Artisanship has no place in the New World, and its disappearance has dissipated certain conceptions of mankind which Europeans consider the very basis of civilization. Mr. Siegfried declares that to express his own personality through his created efforts is the ambition of every Frenchman, an ambition quite incompatible with mass production.

American workmen do not need to worry about the old-world writer who says these things, but there is something to worry about when a senator who has a leading part in the legislation of this country seriously approves such ideas.

If, as Mr. Siegfried says, it is the ambition of every Frenchman to express himself in craftsmanship, what of the desire for self-expression of thousands of French peasants like the "Man with the Hoe." Does the "Man with the Hoe" delight to express his artisanship by digging in the ground? How can his work be higher in the scale of civilization than the self-expression of the American grandson of a "Man with a Hoe" who sits on a 200-hp. tractor, pulling a number of gang plows that do more work for humanity than could be done by thousands of French peasants with hoes. One suspects that many French peasants would prefer the American idea if they had the chance.

Senator King will hardly advocate that the Utah housewife give up her motor-driven washing machine because it was produced by mass production methods, and go back to the washtubs. Is the use of a washtub a higher method of self-expression for the Utah housewife than putting her washing in the washing machine and sitting in comfort, perhaps even reading Mr. Siegfried's philosophy while the machine does the work? Which gives the greater opportunity for culture?

Will Senator King try to persuade the housewife to give up her motor-driven sweeper that gathers up the dust in a sanitary way, in order that she may go back to the broom with its muscle work and its unsanitary dust-raising proclivities? Will the Senator try to persuade the American mechanic to give up his bathtub and his car? Will he ask the American young woman to give up her silk or rayon stockings because they are produced by mass production methods, and ask her to make for herself and to express herself in the sort of stockings that were handknit by her grandmother?

The handicraft methods used much muscle power, got very little production, very poor products, very high priced products, and earned very low wages for the craftsman. It is regrettable that a leading politician in this country knows so little of what mass production by machinery has done for the United States that he seriously spreads ideas like Siegfried's over a large broadcasting chain. This episode may show that the machinery industry, as a whole, ought to organize and become really vocal in pointing out the fallacies of this sort of philosophy.

What this country needs is not less machinery. It needs much more than it has to save muscular drudgery of men and women. It needs fewer "men with the hoe," condemned to the sort of muscular self-expression that still unfortunately clings to European civilization, and more tractor operators who displace the muscle-bound "men with the hoe." It needs more typewriters making more legible records than the best French penman ever made by hand.

If all the machinery now in existence in the United States were to be worn out and there was no way of replacing it, to what a level of misery American life would fall. The great mass of Americans would soon live poorer lives than the Chinese coolies of today, who contrive to get some few benefits from the machinery

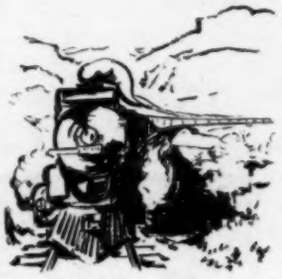
that is in use in the outside world. Even they manage to buy cloth woven by machinery hundreds or thousands of miles away.

Chinese peasants who get salt from the Gobi Desert, take packs of seventy-five to eighty pounds on their backs and travel with them 1,200 or 1,500 miles. They walk for months bringing the salt from the Gobi Desert to a point of consumption. The largest American locomotive with two men in its cab will haul as many ton-miles of freight as a million and a half Chinese coolies can carry in the same time. If machinery is such a monster as Senator King and Mr. Siegfried imagine, why has the wheelbarrow of the Chinese coolie given way to the locomotive?

Somewhere along the line of reasoning there is a very deep pit of logic into which Senator King and Mr. Siegfried have fallen without realizing it. If their ideals are the real thing for humanity, why should Americans be striving to go directly contrary to them? Why does America want machinery to do the hard work and to give man leisure? But men of this type never want to do the back-breaking, muscle-wrenching work to which they would have the rest of humanity go back. They like to take their ease in a comfortable chair produced by machinery. They sleep on a comfortable bed produced by machinery, they wear good-looking clothes and ride in good-looking automobiles produced by machinery. They eat foods produced and transported by machinery. They have luxuries today of which their grandfathers never dreamed.

What would be the answer of hard-headed Utah farmers, whose irrigation ditches are built by machinery nowadays, if Senator King were to tell them to go back to muscle power to dig their ditches, that they might enjoy the feeling of self-expression. What would be their answer if he told them to give up the automobile which enables them to go into Bryce Canyon and into Zion National Park and there enjoy the beauties of nature which they could not enjoy until the automobile was invented? How could those things be enjoyed if roads through these national parks had to be built by sheer muscle power supplemented slightly by the muscle power of beasts of burden? Does Senator King think that his Utah farmers are becoming mere automatons when they drive their tractors? The farmers do not think so, regardless of what Senator King says.

In Europe, where craftmanship still exists there is hard muscle work for the many and leisure for the few. In America the ideal is easier work for everybody. Europeans save the machine and spend the man, while Americans spend the machine and save the man. What poor logic it is to call the old production method of using muscle power at low wages the ideal of civilization. But it is worse logic to decry the American method, which is the exact contrary, and which has raised the scale of living of all Americans quite beyond anything that was ever dreamed of in the philosophy of any European. It is not reasonable to tell Americans that they are making themselves automatons. The fact is that they are giving themselves more leisure to enjoy the good things of life, physical and intellectual. But too often cold facts and the logical progress of events do not mean anything to idealizers who have lost touch with reality.



All of Senator King's fears and all those of Mr. Siegfried have been disproved by the cold logic of fact. America is not going back to hand work, nor back to muscular effort as a means of self-expression. It will continue to do more and more work by machinery. America replaces the pick and shovel man of today with a man pushing a lever tomorrow, and then replaces the man who pushes the lever tomorrow with another who will push a button the day after tomorrow. That is what mechanical industries are doing for the rest of humanity in spite of the awful fate that is visioned by some as the consequence of mechanical progress.

Replacing Endless Belts

By R. H. Kasper
Master Mechanic, Steel Heddle Manufacturing Company

ON CERTAIN machines having a short center drive, we use endless belts of the V-type. There are eight of these belts on each machine, fitting into corresponding grooves in the two pulleys. As this type of belt can only be made endless, and as the pulleys are not on the end of the shaft, it is necessary to remove several bearings and a line of shafting in order to replace the belts.

The average life of a set of belts is from three to four months, and the time required to make the change is approximately five hours for two men. Thus the yearly loss from this cause amounts to a considerable sum where there are a number of machines. Heretofore, the practice had been to run a group of belts to destruction. In other words, if one or two belts failed, the machine was kept running until the remainder of the belts allowed excessive slippage. It is true that when the number of belts was reduced, the belts remaining were operating under an increased load, but it was considered more economical to replace the entire set of belts at one time than to dismantle a machine at more frequent intervals for the replacement of one belt.

In order to reduce the cost of belt replacement, the following method is now pursued: When a new set of belts is installed, an extra set is placed over the shafts. These extra belts are bunched together, wrapped with paper, and tied to a stationary part of the machine, so that they will not touch any revolving part. Now, when a belt breaks, it is a small matter to replace it with one of the extra belts, and it is unnecessary to dismantle any part of the machine. In this manner, until all the extra belts have been applied, the drive is always operating with its full quota of belts.

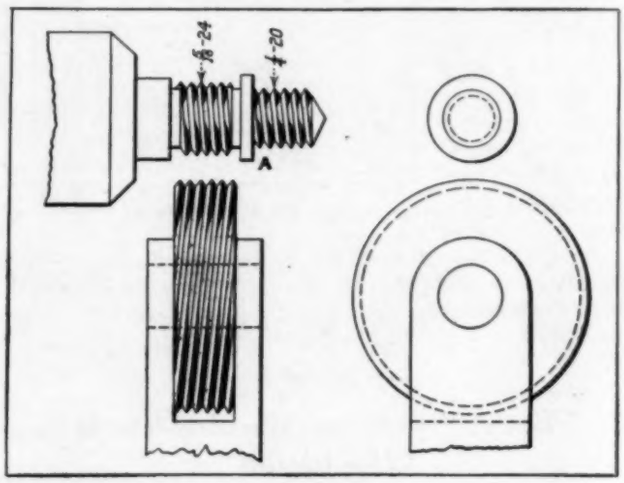
IDEAS FROM PRACTICAL MEN

The department, "Ideas from Practical Men," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from a minimum of five dollars upwards, depending upon their merit.

Thread Rolling in the Screw Machine

By H. M. Darling
Engineer, Wells Brothers Tap & Die Company

While the threading of screws by rolling between reciprocating dies is generally understood, the use of threading rolls in screw machines is rather uncommon. In the screw machine, a thread may be rolled back of a collar on the blank, thus saving a second handling. The



Thread rolling in the screw machine

roll should be suitably mounted in a holder on the cross-slide.

The piece shown at *A* in the illustration is a good example of work suitable for roll threading. On this piece, the $\frac{1}{4}$-20 thread is die cut, but the $\frac{5}{16}$-24 thread behind the collar is roll threaded, making the piece complete when cut off. It is necessary to turn the screw blank to approximately the pitch diameter of the finished screw, as the roll will force up the metal from the root of the thread to form the crest. Some mechanics use the pitch diameter as the correct size of the blank, but for accurate work the exact diameter must be determined by experiment, as it will be affected by the physical properties of the screw stock.

The first problem is to make the roll correctly, and I have been unable to find anything in print regarding its dimensions. By experience, however, I have found a few points regarding such rolls that may be of use to others. The pitch diameter of the roll must be a multiple of the pitch diameter of the finished screw, usually anywhere from two to eight times. It is better to use as small a roll as is convenient, so that the arc of contact will not be too great and cause too much side pressure. The helix angle of the roll must be the same as that of the finished screw. This means that the roll must be multiple threaded, the number of leads depends upon the ratio of its pitch diameter to that of the finished screw. The roll must be threaded in the opposite hand from that of the screw—a right-hand screw requiring a roll with left-hand threads and vice versa.

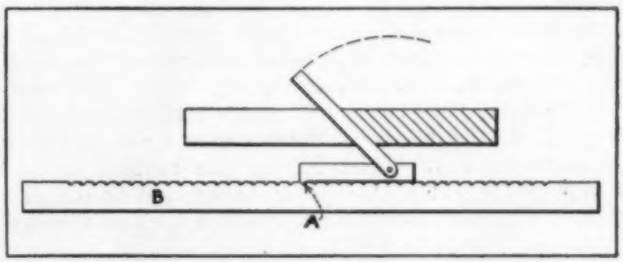
Take the $\frac{5}{16}$-24 screw illustrated as an example. The blank will be turned to the pitch diameter, 0.2854 in. If the pitch diameter of the roll is made four times that of the screw, it will be 1.1416 in., and the outside diameter will be 1.1687 in. The helix angle of the thread of a $\frac{5}{16}$-24 screw is 2 deg. 26 min. As the roll is four times the size of the screw, it must be multiple threaded and have four separate leads (a quadruple thread). Thus the threads on the roll will have the same helix angle as those on the screw.

As any inaccuracy or roughness in the roll will be reproduced in the screw, it is necessary to finish the roll threads very smoothly and accurately after hardening. The hole in the roll should be lapped to run on a hardened and ground pin, because of the wear caused by the pressure in threading. For nice work, the threads on the roll should be ground after hardening. Threads produced by the rolling method will be superior in finish to die-cut threads, with the additional advantage of accurate leads on every piece made.

A Section Lining Device

By John E. Hyler

For the smaller drafting room, where the amount of section lining to be done may not justify buying a regular section liner, the apparatus shown in the illustration may be used with good results. The parts which serve as the lining gage may be made from an old triangle if it is desired to have them of transparent



A section liner for the draftsman

material. Otherwise, they may be made of any suitable material. The one part is adjustable on the other by loosening the thumb-nut, as indicated by the dotted arc. This adjustment can be made use of either to change the

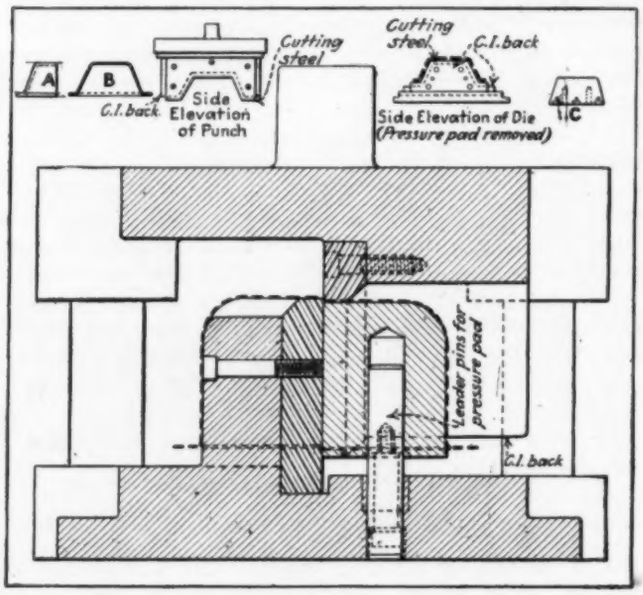
angle of the lines, or to alter the distance between them, within limits. To alter the distance, the bar *B* is set on an angle with a line, instead of placing it parallel as shown.

A lug tooth *A* is provided to fit in the notches, and all guesswork is eliminated. A well-balanced job of lining being the result. The use of such a device as this is not limited to section lining, by substituting a special bar with notches properly cut, special layout lines for a given kind of drawing may be obtained over and over again. Such an arrangement is very valuable in those places which have an oft-repeated layout which varies enough in detail to render it necessary to make many new drawings with the same "blocking out" lines.

A Slitting Die

By Ernest Foldvary

Having an order for a lot of stove flues, such as the one shown at *A* in the illustration, and drawn from sheet metal, we concluded that it would be much cheaper to make stampings from each of which two flues could be



Die for slitting without waste of material

cut. One of the stampings is shown at *B*. At first, we made a splitting die having a punch $\frac{3}{8}$ in. thick. Obviously, the $\frac{3}{8}$-in. piece punched from each stamping was wasted.

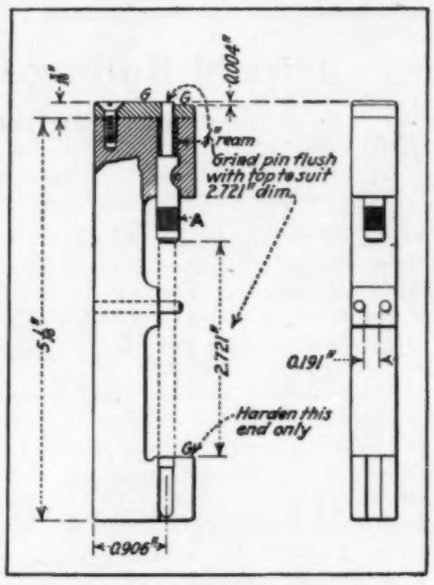
We then concluded to cut the stamping apart by slitting, thus saving stock that would otherwise be wasted. The die shown in the illustration was made. Its main feature is the pressure pad *C*, which slides on two pins pressed into the die-shoe. Springs give it the necessary resistance. Shear blades having the contour of the stamping are held in the punch-holder and in the die-shoe. The work is shown in the die in heavy dotted lines.

One half of the stamping is supported by the shear blade in the die-shoe, while the other half is supported by the pressure pad. As the ram of the press descends, the stamping is sheared in the middle, the pressure pad allowing the part supported by it to descend against spring pressure.

Flush Pin Gage for Production Inspection

By J. S. Browne

For the production inspection of tolerances on parts where it is difficult or impossible to use the ordinary snap gage, the type of flush pin gage shown in the accompanying illustration can be used effectively. The gage shown is employed for length inspection of the typewriter ribbon spool shaft shown in outline in the illustration. In this case the tolerance is 0.004 in., and is easily noted at the top surfaces of the gage when the piece is inserted under the plunger *A*. These flush gages are used regularly on work having 0.002 in. limits. In another plant working on accurate riffle parts, it has been found that the production inspectors can judge accurately within 0.001 in. by using the fingernail on a flush pin gage with straight ground surface. Another advantage is the absence of eye strain.



A flush pin gage for small shafts

Better Oiling on Machine Tools
Discussion

By Wm. S. Rowell

On page 905, Vol. 70, of the *American Machinist* is a discussion, by E. Someton, of machine tool oiling, using my drawing of lathe parts and giving several substitute oiling methods. May I say that what is said is mechanically correct, but there is nothing new.

The felt-packed pocket in lathe carriages has been used for many years, and should be universally adopted.

To introduce lubricant at the point of least pressure between bearing surfaces has been practiced for a long time, but is not universal. As to the longitudinal oil groove shown by me, it was in the stud. Doubtless, a similar one had been in the stud it replaced. And, worse and more of it, an up-to-date motor-driven lathe of the same favorably known make, that recently came into the shop, has a very similar arrangement for oiling the gear and rack-pinion bearing, although some of the other things I had criticised had been remedied.

I wish especially to state that my contribution on p. 330 was not intended as an example of up-to-date designing. It was an example of "getting by" by correcting some things that another one of the all too numerous band of "get by" designers had done many years before.

Characteristics of Hy-ten-sl Bronze

Hy-ten-sl is a bronze in which great strength, toughness, hardness, and resistance to corrosion, combined with good machining properties, are outstanding characteristics. It is made in five grades, the minimum physical properties of which are given in the accompanying table. No. 1A can be supplied with a tensile strength up to 120,000 upon special order.

In addition to the physical properties given in the table, the following are of special interest: Modulus of elasticity, 14,500,000 for grade 1A and 12,500,000 for grade 4; weight per cu.in. 0.280 for grade 1A, and 0.290 for grade 4. The pattern-makers shrinkage per foot is $\frac{5}{16}$ in., and the coefficient of expansion per deg. F. is 0.0000098, for all grades.

For worm-wheel drives operating at slow to moderate speeds (up to 250 ft. per min. lineal contact speed) and particularly where the load is heavy, or the gear subjected to shocks, grade No. 3 is recommended. It is not, however, suitable for high-speed worm wheels. Worm wheels of this material are used on rolling-mill drives, sugar machinery, large machine tools, sluice gates, and locomotive cranes. On exceptionally large drives, where it is advisable to make the worm of bronze rather than the wheel, forged grade No. 1 is used. Spur and bevel gears are also made of grade No. 1. The same qualities that make for this heavy-duty capacity in the case of gears, of course make the material well suited to heavy-duty bearings.

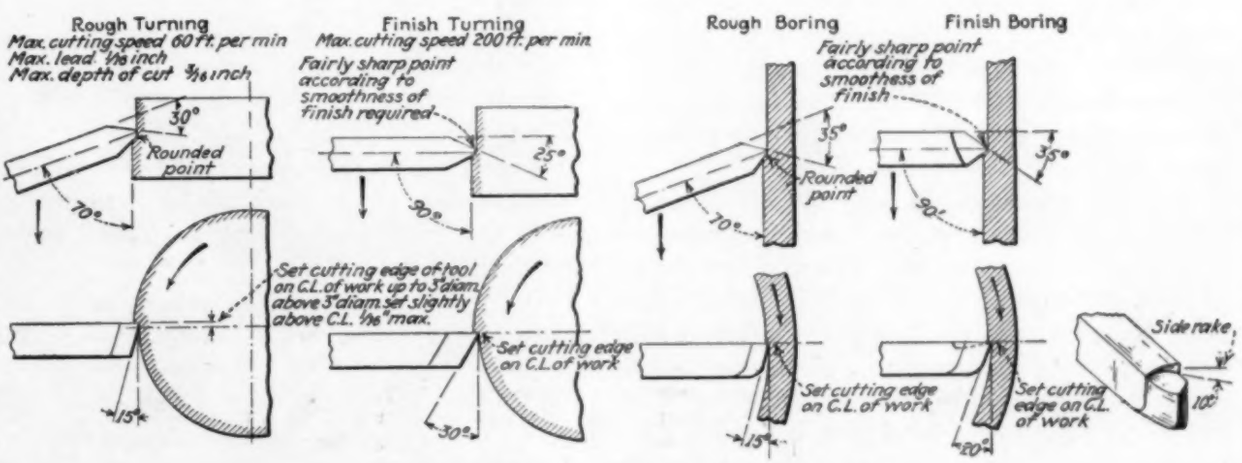
Because of its close-grained structure, Hy-ten-sl bronze is capable of withstanding the highest hydraulic working pressures now employed, without seepage.

In spite of its toughness and hardness, it is stated that this material is easily machined. The metal does not drag or break out, but comes off in long, clean spirals, and there is no tendency for the material to "seize" when the tools are properly ground to the angles shown in the accompanying illustration. Cutting compounds are recommended only for high-speed cutting, or on turret lathes or threading machines.

Minimum Physical Characteristics

Grade of Hy-ten-sl	1A	1	2	3	4
TENSION					
Ultimate tensile strength lbs. per sq.in.					
Sand cast	115,000	110,000	100,000	90,000	85,000
Forged, rolled or extruded	120,000	115,000	105,000	93,000	85,000
Yield point in tension lbs. per sq.in.					
Sand cast	70,000	65,000	55,000	45,000	40,000
Forged, rolled or extruded	73,000	68,000	60,000	50,000	45,000
Elongation in 2 in., per cent					
Sand cast	10	12	15	20	25
Forged, rolled or extruded	8	10	12	15	20
Reduction in area, per cent					
Sand cast	10	12	15	20	25
Forged, rolled or extruded	8	10	12	15	20
COMPRESSION					
Yield point, lbs. per sq.in.	65,000	60,000	50,000	40,000	35,000
Permanent set at 100,000 lbs. per sq.in. (max.)	0.020	0.030	0.050	0.080	0.125
Brinell hardness, No.	240	225	200	185	150

Courtesy of the American Manganese Bronze Company



Recommended cutting angles for machining Hy-ten-sl

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American Machinist

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Machinery and the Electorate

IN AN article appearing elsewhere in this number, Ernest F. DuBrul takes issue with the views expressed by Senator King of Utah in a recent chain broadcast. Senator King apparently approved the conclusions regarding the effects of American machine production on the workman reached by André Siegfried in his book "America Becomes of Age." Mr. Siegfried deplores the reduction of the American workman from an artisan to an automaton and Senator King agrees with him, at least to the extent of quoting him.

Mr. DuBrul's article answers this portion of Senator King's speech effectively, but does not touch on that part of it which views with alarm the disastrous effect of mass production methods, and the concentration of capital to that end, on the democratic institutions of America. The senator says, "That there are evils resulting from consolidated capitalistic control of industry must be admitted by all. The initiative and independence of the people will be affected and the moral qualities of society modified."

Certainly, but will the effects be as unfavorable as Senator King implies? Isn't it reasonable to believe that the man who operates a complicated machine eight hours a day, and who finishes his work comparatively fresh, and with leisure to read and roam about the nearby country in his car, will take a more intelligent part in the affairs of his community and of the nation, than the man who labors with his unaided muscles for ten or more hours and finishes his work tired out?

The senator overlooks also the difference in mental attitude between the American workman, who is more likely than not to have a few shares of stock in the company that employs him, or some other company, and the European workman who has been carefully trained to believe that he can never bridge the gap between drudgery and independence. On the one hand there is the optimism of opportunity, and on the other the smoldering resentment of repression. Which makes the better citizen?

Entertainment or Information at Cleveland?

MEN who will attend the Machine Tool Exhibition at Cleveland are presumably in search of the latest information regarding the production to be expected from the machines exhibited. Anything which interferes with their obtaining this information deprives them, their employers, and the machine builders of the advantages of such an exhibition. Unless the time and money spent in attending these shows yields an adequate return, it is a poor investment and will not be continued indefinitely.

Entertainment of customers is not subject to standardized rules and regulations, but when it is carried to the point of interfering with the object for which shows are held, it becomes a menace to all concerned. Complaint has been made by several manufacturers regarding the evils of too much entertainment at previous shows of various kinds. Men who are not accustomed to freedom from the restraint of shop hours and home surroundings are not always able to judge wisely as to how far they should permit themselves to be dined and wined by those who sell, or hope to sell, equipment to their plant. Some managers, at least, have expressed doubt as to the desirability of letting their men attend, owing to unfortunate and unprofitable experiences in the past.

There are advantages in the plan adopted by several companies that send men to conventions or exhibitions which requires a report of the convention or the machines examined. Unless an intelligent report is forthcoming the same man does not go again. If a man is entertained to the extent of interfering with the object of his visit his manager is not apt to consider favorably the company responsible for his failure.

In the interest of all concerned it is wise to exercise extreme moderation in entertainment. Time is limited at best and unless the visitor carries away real information concerning equipment in his line, the object of the exhibition has not been fully accomplished and both user and manufacturer lose.

It will be well for sales managers to watch expense accounts for entertainment very carefully. Expenditures of this kind may easily prevent sales rather than encourage them. It must be remembered that the object of shows is to impart information that will sell machines, not to show a customer how much or how foolishly money can be spent in his entertainment.

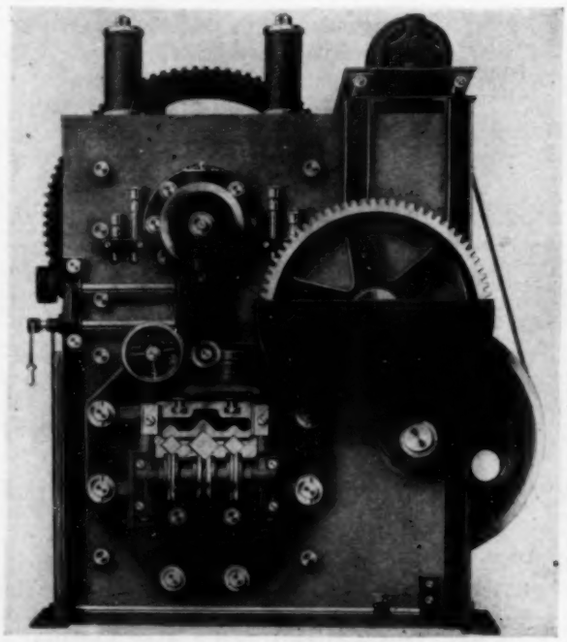
SHOP EQUIPMENT NEWS

Smith Model 76 Bar and Billet Shears

A BAR and billet shear of unbreakable steel-plate frame construction built by R. Sonntag, G.M.B.H., Gera-Zwoetzen, Germany, and distributed in this country by David H. Smith & Sons, Inc., Brooklyn, N. Y., has a capacity of a 6½ in. square billet sheared cold.

The body of the machine consists of two unbreakable rolled steel plates of special analysis, having a high tensile strength. They are held together in an integral unit by bolts fitted into reamed holes. The cast separators between the plates form the guides for the shear-blade slide. The shearing opening in the body is reinforced by a steel casting which distributes the pressure to the two frame plates which are held by heavy bolts. The bearings for the shafts are held in castings fitted into holes bored in the frame plates. The lower knives are mounted on this casting and are easily removable. The manufacturer claims for this type of construction the advantage that all the shearing pressure and its reaction on the bearings is taken up by steel plates of the body. The bolts are not subject to any pressure caused by shearing. The slide holding the upper shearing knives is of cast-steel ribbed and is counterbalanced, and slides in long adjustable guides. The eccentric shaft is made of forged steel and is driven by double gearing.

Gears are of cast steel. The teeth are cut to insure easy running with a minimum of power when running idle. The flywheel shaft is ground accurately and revolves in long bronze bushings with double oil-ring lubrication. All bearings are bronze-bushed. Shearing knives are made of high-grade tool steel. The hold-down clamp can be adjusted to the bar being sheared by means of a handwheel and worm gears. The bars are fed into the machine over an adjustable swivelling roller. Controls are operated by hand lever or foot pedal which engages a claw clutch of improved design. This permits three points of engagement for every revolution of the main wheel. The clutch disengages automatically upon completion of the stroke.



Smith Model 76 Bar and Billet Shears

Lubrication is provided for on all moving parts. On the larger sizes of the machine a central automatic oiling apparatus with a visible oil drip is used.

Standard equipment is one pair of knives for either rounds, squares, or flats. The machine is supplied with either belt drive with tight and loose pulleys or with geared or belted motor drive. An adjustable back gage or stop is furnished as an extra. The machine is offered in nine sizes, having capacities varying from $2\frac{9}{16}$- to 7-in. rounds sheared cold. Shear knife lengths vary from 8½ to 18 in., and the stroke varies from $1\frac{3}{4}$ in. to $4\frac{7}{8}$ in. A 6½-hp. motor is required for the smallest size and a 65-hp. motor for the largest. The smallest size machine operates at 420 r.p.m. and the largest at 320 r.p.m. The approximate weight of the smallest size is 4,800 lb., of the largest, it is 56,000. Floor space varies from 5x4 ft. in the smallest to 12x8½ ft. in the largest. The smallest machine makes 22 strokes per min. and the largest 10 strokes per minute.

"Una" No. 76 Welding Rod for Dies

A welding rod for flat welding of dies only is being marketed by the Una Welding & Bonding Company, Cleveland, Ohio. The rod is particularly adapted for high-carbon tool steels for die work, and where extreme resistance to abrasion and shock is required. The rod makes a weld of fire-hardened metal with minimum porosity and with a scleroscope hardness of 60 to 70 which can be further hardened by heat-treatment if desired. A heavy coating provides for alloying in the oxidizing element and concentrates the arc. The rod is available in the standard sizes varying from $\frac{1}{8}$ to $\frac{1}{4}$ in. in diameter and about 14 in. in length. The unit package is 10 lb. in weight.

Ryerson Cold-Finished, High-Manganese Screw Stock

A cold-finished, high-manganese screw stock is being marketed by Joseph T. Ryerson & Sons, Inc., Chicago. The steel is an open-hearth steel containing a relatively high per cent of manganese, but it retains free machining qualities characteristic of ordinary screw stock. The case-hardening properties of this stock are also good, the stock being case-hardenable by either the standard carburizing process or by cyanide treatment with either oil or water

quenching. The stock has a tensile strength of 76,000 lb. per sq.in. in its natural condition, with a Brinell hardness of 160. This may be increased by a water quench to a tensile strength of 130,000 lb. per sq.in. and a Brinell hardness of 300. Stock sizes are ¼ to 3 in. in diameter.

Adams Milling Head for Planers

A RE-DESIGNED milling machine head for planers is being manufactured by the Adams Company, Dubuque, Iowa. The head is now supplied completely Timken-bearing equipped. Both the main spindle and worm shaft rotate on Timken tapered roller bearings of excess load-carrying capacity, and the drive is by means of a hardened steel worm engaging a phosphor bronze worm wheel on the spindle. The heads are made in three sizes.

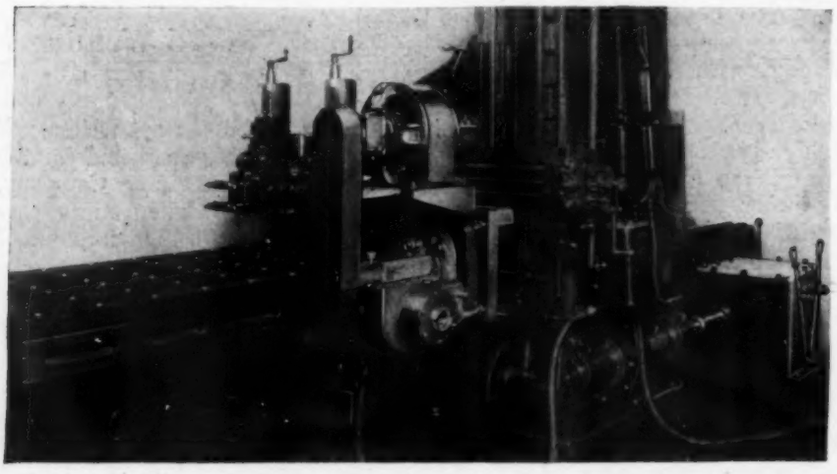


Fig. 1—Adams Improved Milling Machine Head for Planers applied to a motor-driven Cleveland open-side planer

In the set-up illustrated, the head was mounted in a fixed position on a special saddle, which was in turn mounted on the standard planer saddle. The special saddle incorporated an overhanging bracket on which the motor was mounted, the drive from the motor to the worm being through silent chain and sprockets. The necessary table speed reduction for milling purposes was taken care of by inserting between the planer drive motor and the planer drive shaft a special variable speed gearbox, shown in the installation view and also in the separate illustration. The planer head is supplied ordinarily with a saddle planed to fit the individual planer rail, the head being so mounted on the saddle that it can be swiveled for horizontal, vertical, or angular milling as the job may require.

The driving motor is 25 hp., having variable speeds from 250 to 500 r.p.m. Operation of the lever shown at the right of the gear box couples the driving and driven shafts by means of a friction clutch, resulting in a straight-line drive for planing purposes. Throwing out this clutch and shifting the sliding gears by means of the two levers shown in the front of the box provides the necessary speed reductions for milling purposes. In this case, two series of speed reductions were made available, one from 3 in. to 18 in. per minute and another from 12 in. to 72 in. per minute. It can be seen that by varying the gear combinations in the box, this unit may be applied to practically any direct motor driven planer. The gear box incorporates the use of multiple-splined shafts all of which are mounted on Timken roller bearings.

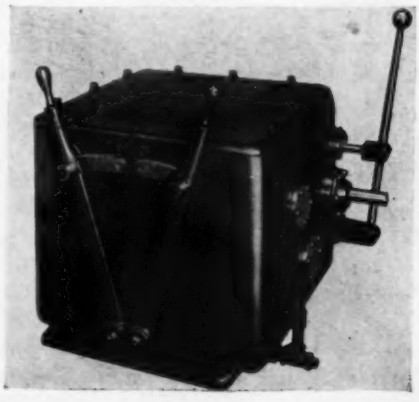


Fig. 2—Special, Variable-Speed Gearbox inserted between the planer drive motor and the planer drive shaft

Jessop "OK" Chisel and Snap Steel

A chisel and snap steel for hand and pneumatic chisels, boiler cups, snaps, punches, shear blades and all shock-resisting tools, and for set-screws for holding cyanide-hardened dies, is being produced by William Jessop & Sons, Ltd., Brightside Works, Sheffield, England, and is being marketed in the United States from 121 Varick St., New York. This steel is an alloy steel which can be forged or hardened with ease in a blacksmith shop and does not require special hardening equipment. The manufacturer claims for it the ability to overcome breakage and loss of cutting efficiency ordinarily experienced with tools manufactured of this class of steel. It is delivered in a specially treated condition which removes the necessity for hardening any part of the tool except the working end. All standard octagon dimensions are available from stock, and round, flat, oval, and square sections are available on short notice. The stock contains about 2 per cent tungsten and 0.40 per cent carbon.

Houghton Absorbed Oils and "Cosmolubrics"

A complete line of absorbed oils and "Cosmolubrics" for plant lubrication is being introduced by E. F. Houghton & Company, Philadelphia, Pa. Several of the oils have been previously marketed, but until the present time, oils of all weights and for all uses have not been available. The absorbed oils are claimed by the manufacturer to consist of two oils in one, a film oil and a "lubricity" oil, the film oil acting as a piece of saturating blotting paper holding the "lubricity" oil on the bearings. When the bearing is under slight pressure, a small amount of the lubricating oil is

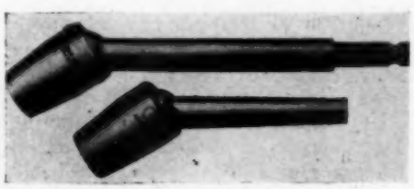
necessary and only a small amount is squeezed from the film oil. Under high pressure or when sharp or heavy loads occur, a greater quantity of this oil is necessary and a greater quantity is squeezed out of the film oil. When the load is decreased the film base reabsorbs the lubricating oil and retains it. The line of "Cosmolubrics contains all oils from very light body to extremely heavy body oils.

Simonds High-Cobalt Toolbit

A high-cobalt toolbit designed for use on lathes, planers, and shapers for high-speed work is now manufactured by the Simonds Saw & Steel Company, 127-129 South Green St., Chicago, Ill. The toolbit carries a double diamond marking, each diamond containing within it the conventional Simonds S. The steel can be furnished in hardened bits or in annealed bars and is available in all standard sizes.

Apex Universal-Joint Nut Setters

A universal-joint nut setter adapted to setting nuts and cap screws in inaccessible places is being manufactured by the Apex Machine Company, Dayton, Ohio. The socket end of the joint is made to fit over the nut and the shank on the ball end is made to specifications as to length, shape, and similar dimensions. The manufacturers claim unusual strength in this tool at extreme angles, and also claim the setters to be able to set nuts tight in one operation. The tool is made of special alloy steel and will operate up to 30 deg. The illustration shows



Apex Universal-Joint Nut Setters

both the straight-shank tool for welding to hand braces and the special long-shank tool with a hexagon end for use in portable tools.

Farrel-Birmingham Metal-Forming Mill

THE metal-forming mill illustrated in Figs. 1 and 2, is of a design conforming closely to the design of continuous mills for rolling hot bar and strip. It is being manufactured by the Farrel-Birmingham Company, Buffalo, New York.

Each stand of the mill is an individual unit and has an individual drive, thereby preventing noise and clumsiness formerly encountered with the train of spur gears used. Each drive uses bevel gears incased in cast-iron housings and receives power from a single backshaft driven by a motor. The individual stand houses the spindle bearings, the connecting gears, and the mechanism for adjusting the roll centers. The stand has greater strength and heavier weight than the previous designs, and it is possible to add or subtract from the mill from time to time as different shapes of metal are formed. On heavy production work, a duplicate set of stands can be made ready so that at the finish of one production job the changeover can be immediately effected. Both the stand and the gear drive unit are fitted throughout with anti-friction bearings and are lubricated automatically. Both top and bottom spindles are held rigidly to the roll housing during the rolling operation and the top roll spindle is carried in anti-friction bearings in a single saddle. It is placed against the cap by heavy springs and held in place by guide plates.

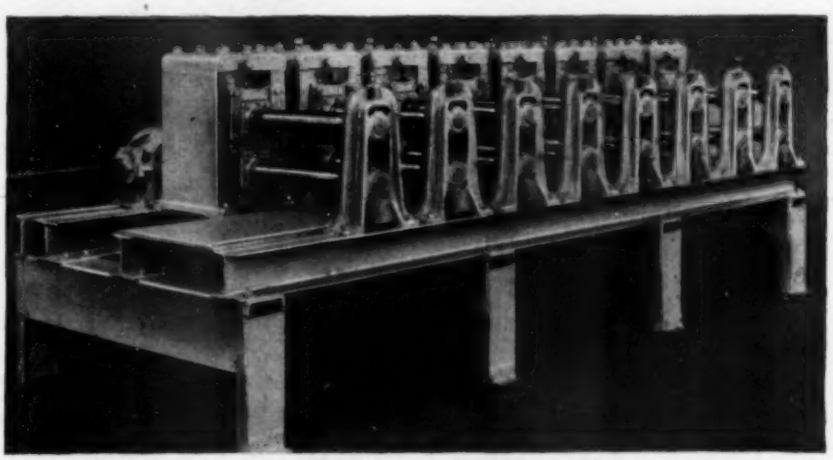


Fig. 1—Farrel-Birmingham Metal-Forming Mill, showing spindle stands

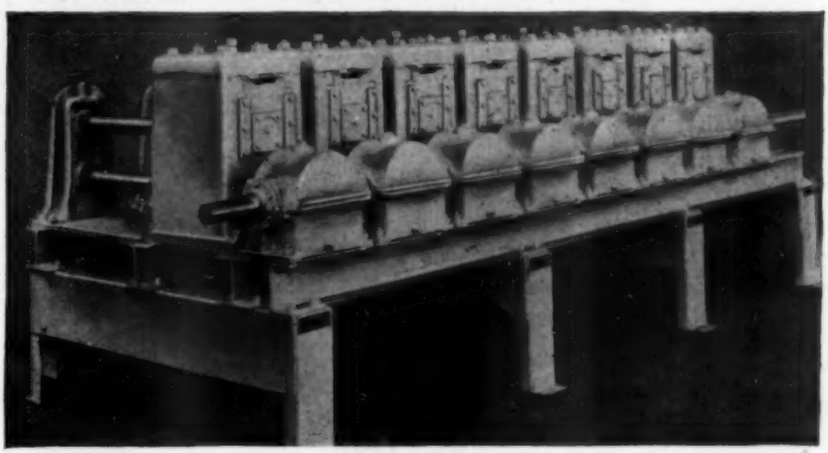


Fig. 2—View of opposite face, showing backshaft and individual geardrives

The wedge, which is free to move in and out, is inserted between the top roll spindle saddle and the housing cap. This movement is controlled by the horizontal screw with the hexagonal head on the outside. Turning the hex head of the screw to the right

or left will elevate or depress the top roll spindle. By the introduction of two capscrews which pass through the cap of the roll stand and the wedge, and which are threaded into the top roll spindle saddle itself, this saddle and wedge can be clamped tightly against the cap when the mill is at work.

Semi-steel is used instead of cast iron for castings. The steels used are heat-treated and of alloy analysis. The manufacturers claim that this type of forming mill will give greater production with more accurate sections and a superior finish. The flexibility of the design, it is claimed, results in considerable saving in operating costs.

Kent-Owens No. 2 Power-Feed Milling Machine

An improved type of milling machine has been placed on the market by the Kent-Owens Machine Company, Toledo, Ohio. The machine is of the column and knee type, but with the spindle mounted in a head that can be fed vertically.

The spindle drive belt direct from the backshaft is equipped with an idler to maintain the proper belt tension for all positions of the head. Both the spindle and the backshaft are mounted on Timken tapered roller bearings. Pickoff gears, mounted in the case shown, provide different spindle speeds. The drive can be taken either direct from the countershaft to a two-step cone pulley on the backshaft or by chain from a motor mounted on the right-hand side of the column.

Power feed and hand quick return to the table are provided. Upon light and short cuts, the table hand feed can be used. Pickoff gears are used on the table for obtaining different feed. The table working surface is 7 in. wide by 28 in. long and has a large trough surrounding it, making the overall dimensions 14x35 in. The maximum distance from the spindle to the table is 17⅛ in. The hand feeds to the table and head are 4¼ in., and 6½ in., respectively. The table has a 22-in. feed by crank and the saddle a 7-in. feed by crank.

A heavy flywheel-type pulley is used on the spindle to prevent chatter. The entire head assembly is counterbalanced, and hand operating levers are conveniently placed. The lever to the head is adjustable to two lengths, providing for either heavy or light cuts. Adjustable stops limit the head travel and trip dogs engage or disengage the table feed. The equipment is furnished complete with countershaft and wrenches. A 3- to 5-hp. motor is used for motor drive. Net weight of the machine is approximately 2,600 pounds.

Kent-Owens No. 2 Power-Feed Milling Machine

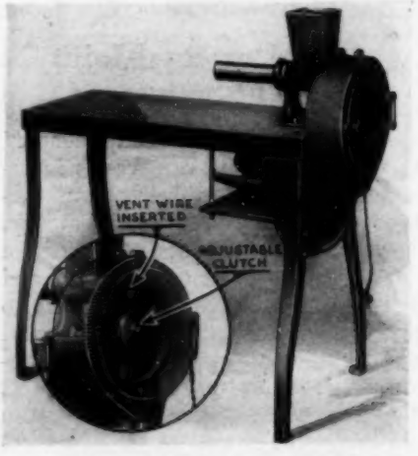
"Vasco Colhed" Cold-Heading Die Steel

A carbon-vanadium tool steel made especially for cold-heading dies is being manufactured by the Vanadium-Alloys Steel Company, Latrobe, Pa., and is being marketed under the trade name of "Vasco Colhed." The steel contains a higher vanadium content than "Vasco Special" and is manufactured in one carbon range only. It is especially processed so that the centers of the bars are sound, and both ends of each bar are inspected for sponginess and non-metallic inclusions by the deep-acid etch method before shipment.

Vasco Colhed can be hardened through a wide temperature range and can be quenched in brine from a temperature as high as 1,800 deg. F., without danger of breakage. The depth of the hardened case can be controlled by varying the quenching temperature. The manufacturers claim for this steel the ability to harden with a tough core in order that the die will not split. It is also claimed to harden with a sufficient depth of case so that the impression will not sink and the case itself is sufficiently tough to prevent spalling and chipping. The steel is obtainable in the usual sizes.

Wadsworth No. 1 Core-Making Machine

A motor-driven core-making machine using the same dies, conveyor screws, and other accessories as the No. 1 hand-type core-making machine is being manufactured by the Wadsworth Core Machine & Equipment Company, Akron, Ohio. The machine has a capacity of from ⅛ to 3 in. diam. cores and is direct-connected for motor drive, powered with ⅓ hp. motor operating on 110 and 220 volts alternating current, which allows the core-making machine to be operated from the ordinary light circuit. The machine has a simple and efficient safety clutch incorporated in the drive, which takes care of any interruption that might occur by allowing a slippage that protects the gear teeth and also prevents burning out of the motor.



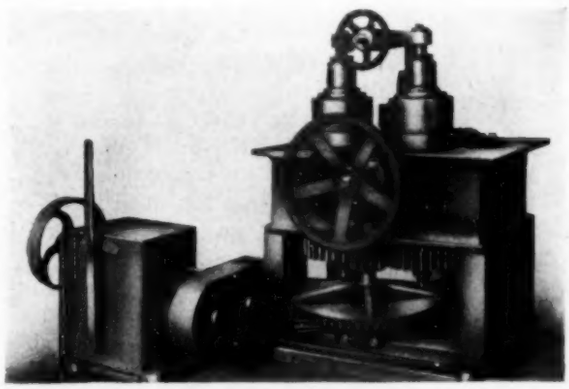
Wadsworth No. 1 Motor-Driven Core-Making Machine

Lubrication is taken care of at four places located at convenient points on the machine. All parts are easily accessible. Stopping and starting is controlled by a push button switch located at the operator's right hand. The manufacturers claim much more speedy operation than is accomplished by the hand-operated machine.

Smith Cold Bending Machine

A COLD bending machine for rolling angles, tees, beams, channels, flats, rounds, and squares in circles or arcs, is being marketed by David H. Smith & Sons, Inc., 51st St., Brooklyn, N. Y., and is imported from Germany, being constructed by Herkules-Werk, Wetzlar.

The machine has a cast table on which are three rolls mounted on vertical shafts. Two of these rolls are in a fixed position. The third roll is the pressure roll, which is mounted on a slide and is moved inward horizontally by means of a large easily operated handwheel at the side of the table. This handwheel applies the pressure for obtaining the required diameter while the ring is being rolled. All pieces are bent cold. The ends may be allowed to overlap and be cut or burned off later or they may be heated and bent to the required curve before or after rolling the remainder of the ring. Finished rings may be removed quickly from the rolls by releasing the pin from the yoke at the top end of the pressure roll shaft and moving this roll outward. The larger sizes of the machine have two speeds obtained by the interchanging of two gears.



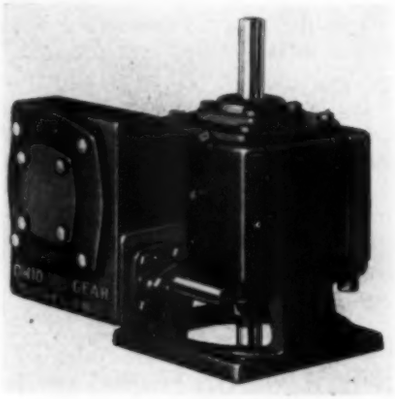
Smith Cold Bending Machine

The rolls used in this machine are of special construction to enable the machine to perform the great variety of operations which are claimed by the manufacturer. The rolls proper are composed of two sleeves, an inner sleeve and an outer sleeve, both of which are adjustable. By manipulation of these sleeves, the machine is set up for the various types of work which it performs. It is not necessary to change the rolls for various bending operations. A simple adjustment suffices. Guide rolls are adjustable radially and vertically, thereby avoiding any twist in circles.

The machine is built to roll in a horizontal direction, thus permitting easy handling of the longest bars and largest rings. A reversible clutch is used which eliminates the necessity for a reversible motor. A special roll may be obtained for the machine for the bending of pipes. The controls of the machine are centralized to permit one operator to handle the common run of work. The manufacturer claims true and round rings or arcs. The machine is made in six capacities, the smallest size handling angles with the leg out 2x2x¼ in., rolling to a smallest diameter of 24 in. The largest size will handle angles, leg out, of 8x8x1 in., rolling to a small diameter of 118 in. In the smallest size of the machine, the rolls travel 15 ft. per minute. Five larger sizes have two speeds varying from the first of 9 and 20 ft. per minute to 6 and 18½ in the large machine. Three and a half horsepower are required for the smallest machine, 27 for the largest. The smallest machines requires a floor space of 2x4 ft. and weighs 1,500 lb. The largest requires a floor space of 11x11¾ ft. and weighs 36,300 pounds.

Ohio Double-Reduction Speed Reducers

A line of double-reduction speed reducers to supplement the single-reduction units manufactured by the company is being introduced by The Ohio Gear Company, 1333 East 179th St., Cleveland, Ohio. The speed reducers are equipped throughout with Timken roller bearings, hardened and ground worms, and bronze worm wheels. As with the single-reduction units, many different ratios are available in these units, the high limit being



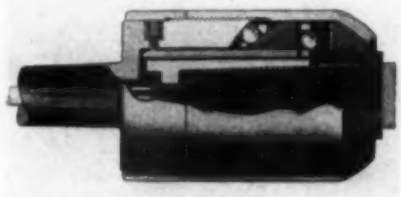
Ohio Double-Reduction Speed Reducer, showing the high-speed shaft horizontal and the low-speed shaft perpendicular

24,000 to 1. The illustration shows a case with high-speed shaft horizontal and low-speed shaft perpendicular. The case is also made with both shafts horizontal.

The speed reducers are available in standard ratios of from 100 to 1 to 24,000 to 1 and torque capacities varying from 100 in.-lb. to 3,200 inch-pounds.

Apex Floating Toolholders

The interior design of the full and semi-floating tool holders being introduced by the Apex Machine Company, Dayton, Ohio, is claimed to give the toolholder absolutely free flotation. Angular flotation is obtained by the upper rows of ball bearings and parallel flotation by the lower rows. In each case there are two rows of ball bearings at right angles. The balls operate in hardened and ground grooves and minimize friction to produce a free floating tool. The semi-floating holder has a parallel float using only the lower row of ball bearings.



Apex Floating Toolholders

In operation, the reamer follows the hole, correcting for any misalignment

between work and spindle or turret, thus eliminating bell-mouthed and tapered holes, giving straight holes true to gage size. Holes tapped true to tap size are also claimed to be a feature of this holder. To reduce the overall length of the tool, the inserted socket type has been added. This type with either Morse taper or straight hole is adaptable to hand screw machines and automatics where very little overhand is desired.

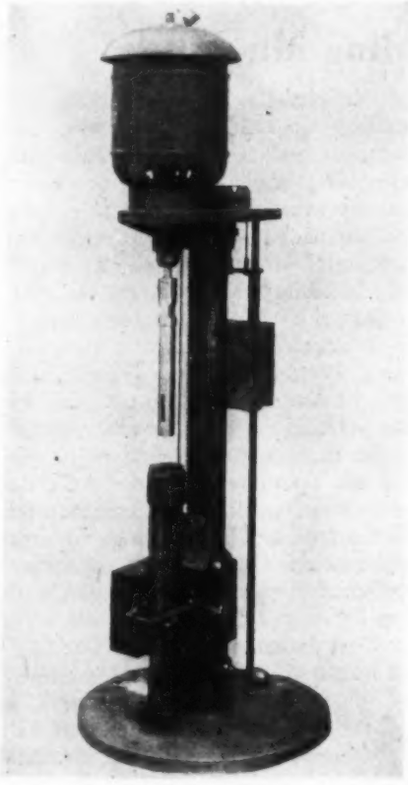
"Una" No. 65 High-Tensile Welding Rod

For flat, vertical, and overhead manual welding and flat automatic welding, a high-tensile welding rod has been developed by the Una Welding & Bonding Company, Cleveland, Ohio. It is available in unit packages of 25 lb. in standard sizes varying from $\frac{1}{8}$ to $\frac{1}{4}$ in. in diameter, and in 14-in. lengths, and also in rolls for automatic arc-welding. The rod is used for welding boilers, tanks, cast steel, and structural work requiring high tensile strength and may also be used for building up wearing surfaces requiring machinability. A tensile strength of approximately 60,000 lb. per sq.in. is claimed for the rod. The rod is coated, and is designed to permit stripping at any point and establishing an arc instantly.

"Adjustable" Lapping Machine for Air Hammer Cylinders

Although especially built to grind or lap the cylinders of air hammers, the device shown, which was developed by the Adjustable Lap and Tool Company, Inc., 311 N. Second Street, St. Louis, Mo., will lap, grind or hone a hole of any size from $\frac{1}{2}$ to 6 in. by substituting various-sized hone holders. In the illustration, a cylinder of an air hammer is shown mounted in the V-block ready for the honing operation.

The device is intended for bench use and is mounted on a base 16 in. in diameter. It consists essentially of a means for holding the cylinder and a direct-connected electric motor for driving the hone. In the machine shown a $\frac{1}{4}$-hp. ball-bearing motor is



"Adjustable" Lapping Machine for Air Hammers

used in conjunction with a Standard Tool Company chuck. The work support, in the case of the air hammer, consists of a V-block with a latch and clamp with wing nut for locking.

The member in which the V-block is mounted slides up and down the vertical cylindrical column, and is actuated by a rack and pinion that also serves as a key to guide the motion of the holder. In addition, there is a key in the back of the column so that the work-holding member is rigidly centralized under the driving motor. Setscrews behind the inserted V-block allow an initial adjustment to be made so that the work is lined up central with the center line of the hone. About 11 in. of travel vertically is provided the work-holding member, which is counterbalanced at the rear.

The hone itself consists of a sleeve having four slots, together with a taper pin for advancing the stones outwardly $\frac{1}{4}$ in. Adjustment is made through a knurled screw sleeve exposed through openings in the upper part of the hone sleeve.

According to the manufacturer, the device will remove any taper or out-of-round condition, and will not produce a bell-mouthed hole. The time for finishing one air hammer cylinder is about 2 minutes.

"All-Purpose" Model Sprayit Equipment

Designed to meet the demand for a portable electric hand sprayer which has a pressure-feed container, and which is suitable for covering wide surface and for all types of commercial and production work that cannot be handled advantageously with a cup gun outfit, the Electric Sprayit Company, 320 East Colfax Ave., South Bend, Ind., is announcing an "All-Purpose" electric "Sprayit." The outfit consists of a rotary compressor of special design operated through a direct drive by a $\frac{1}{4}$-hp. motor. The compressor delivers a constant air volume of 5 cu.ft. per min., which does away with the necessity of an air storage tank. The pressure feed tank holds approximately 2 gal. of material, which will cover about 700 sq.ft. of surface. A one-quart container is also furnished and can be quickly connected to the gun for small touch-up and trimming jobs. A commercial gun completes the equipment.

The complete outfit weighs approximately 50 lb. and can be carried to the job. Twelve feet of electic cable and 20 ft. of rubber hose between the compressor and the container are provided, as well as 8 ft. of air and paint hose to connect the gun and the container. The sprayer is also obtainable with a gasoline engine for use where electric current is not avail-

"All-Purpose" Model Sprayit Equipment

able. This self-powered unit is of the same compact design as the electric model and weighs approximately 70 lb. A $\frac{3}{4}$-hp., air-cooled engine is used for supplying air under pressure.

"Rotomatic" No. 3 Continuous Pipe-Threading Machine

DESIGNED to thread pipe up to 4 in. in diameter as a continuous operation, the No. 3 "Rotomatic" has been placed on the market by the Davis & Thompson Company, 57th Ave. and Mitchell St., Milwaukee, Wis. The illustration shows the machine as set up in the builder's shop, but, when in operation in the owner's shop, there will be skidways on the operator's side of the machine to take pipe unloaded from a crane. The crane will handle from 5 to 7 tons of pipe, and places the work on the skid. The pipe is rolled down to the conveyor which is part of the machine. Stops are arranged so that fingers that pick up the pipe will only pick up one pipe at a time.

The conveyor carries the pipe toward the machine proper and delivers it to rolls beside the conveyor chain, from which the pipe is rolled up against the channel iron stop. The rotating member of the machine has fingers projecting out and between the chains of the conveyor and these fingers pick up the pipe and place it into the jaws. The jaws are arranged as shown in Fig. 2 with a toggle mechanism and the patented chain clamping arrangement wraps around the pipe carrier, bringing pressure on to the toggle jaws which clamp the pipe. The dies then come forward and the pipe is threaded during the rotation of the work carrier. When the pipe is threaded to the proper length, the die opens automatically and the spindle is withdrawn.

Dies are operated by a cam and springs located on the top of the machine and the dies are forced on the pipe under the proper pressure. After the spindle is withdrawn the toggle opens automatically and releases the pipe, the pipe rolling to the back of the machine on cast-iron ways. When the spindle is retarded or drawn back, the die is closed automatically ready to receive another pipe for the threading operation.

The Rotomatic No. 3 has six spindles and each spindle carries a die. Spindles are arranged so that they will thread the pipe concentrically. Lubricant is forced through the fixture and squirted into the dies at high velocity, and the dies are constructed so that particles of dirt and scale are washed out. Dies are all hardened and ground.

The automatic safety device on the machine operates in case a pipe becomes stuck in the die and the machine stops automatically. There are other safety devices on the machine which insure that it will remain in constant operation without breakage.

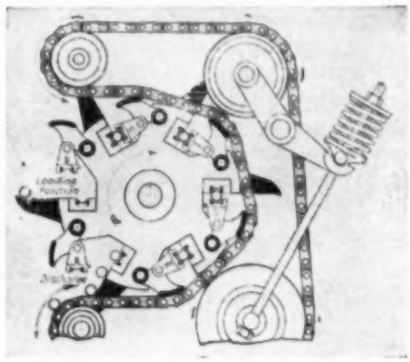


Fig. 2—Method of clamping pipe in the toggle mechanism of the No. 3 "Rotomatic." The toggles are raised automatically by cams and pipes are thrown in without obstruction

The Rotomatic is generally equipped with a variable speed motor and power is transmitted by a silent chain to a main drive shaft. From this shaft, power is transmitted to the friction disk clutch through a silent chain. The clutch is operated by a handle in front of the machine and controls the revolving pipe carrier and the travel of the spindles. Sliding gears in the head of the machine give speeds beyond those available by the variable-speed motor, so that the machine can be used for cutting pipe as small as 1 in. by using adaptors with smaller dies. Attached to the same section of the machine is a gib

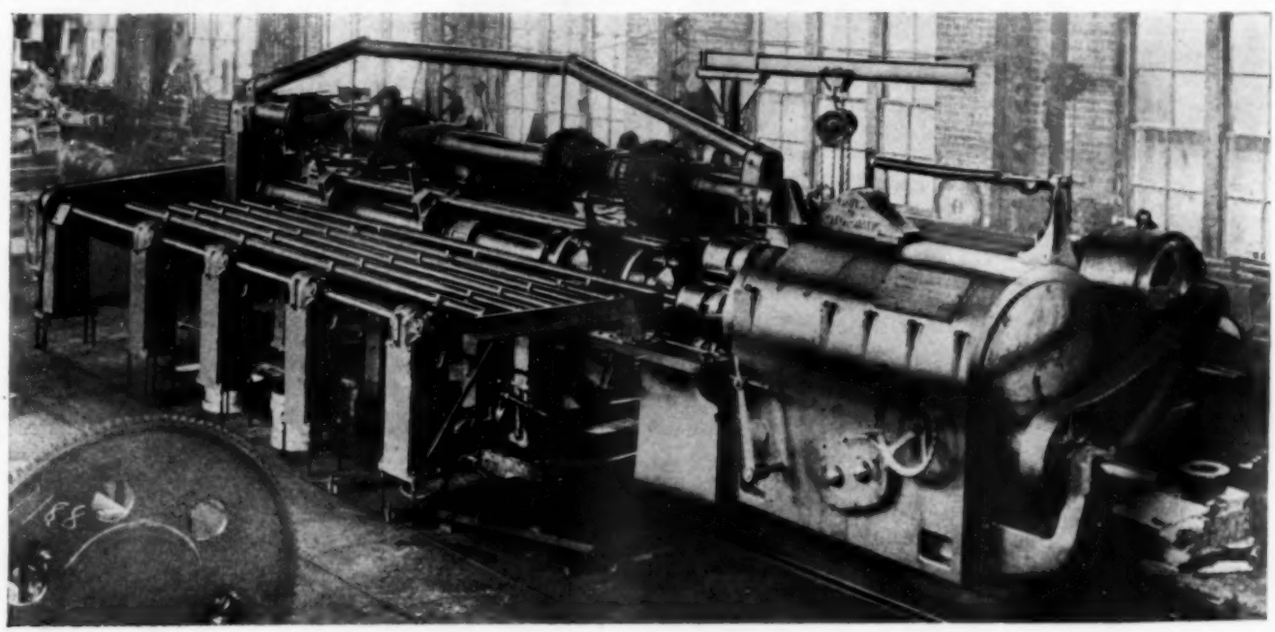


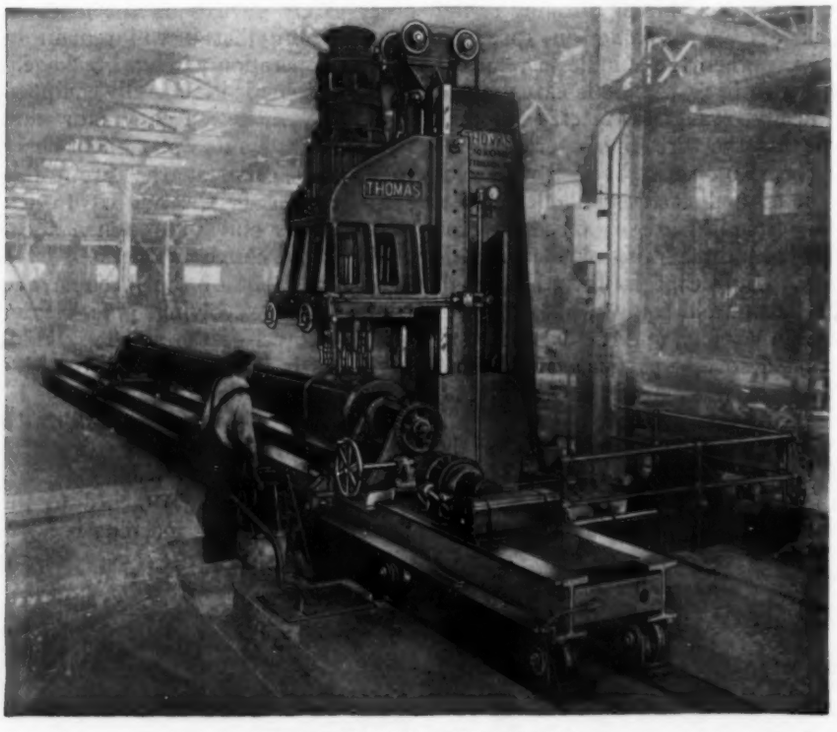
Fig. 1—Davis & Thompson No. 3 "Rotomatic" Pipe Threading Machine

crane which may be used for removing dieheads should a large traveling crane not be available. The dieheads weigh about 400 lb. each. Chasers or segments can be changed readily without removing the head from the machine. The diehead is adjustable for proper size and will maintain the size when set. They are a patented construction designed for this machine.

The machine is made to function at a high rate of speed and is entirely automatic in its action. It is claimed to be built with sturdy proportions to insure long wear and reliability. The weight is 60,000 pounds.

Thomas Multiple Drilling Machine

THE multiple drilling machine illustrated is one of a line of heavy-duty drills recently developed by the Thomas Spacing Machine Company, Pittsburgh, Pa. This machine, claimed to be by far the heaviest of its type on the market at the present time, has been built for the purpose of drilling rivet holes in structural steel.



Thomas Multiple Drilling Machine

The drill is mounted on an extra-heavy cored column, in which the counterweights are completely inclosed, and on which the drill head moves. A variable-speed motor is mounted vertically on the top of the head and travels with it. Directly between the motor and the spindles is a totally-inclosed gear chest consisting of 98 heat-treated and ground Westinghouse-Nuttall gears. Each gear is supported on either side by a Hyatt roller bearing. Lubrication is supplied to the chest by an oil pump which supplies oil under pressure over all the gears, thus assuring proper lubrication at all times. The gear chest has been so designed that for 90 per cent of the time there is practically no angle to the universal joints.

Oilgear feed gives a wide range of drilling speeds and provides a rapid traverse when approaching or withdrawing from the work. The maximum feeding pressure is high.

The standard roll-over table furnished with the drill embodies the latest improvements. Power driven in both directions, with a handwheel furnished for fine adjustments, it is operated through controls grouped directly in front of the operator. Both flanges and the web of structural sections are drilled from one set-up through the roll-over feature. The spacing feature on the table does away with laying out of the work. Spacing is obtained by an indicator templet having three lines—one for each flange and one for the web. The cost of the templet is small since it consists of a strip of wood with lines at proper intervals.

The paper or drilling templet is a printed form that is marked to enable the operator to select the proper cluster of drills for each drilling. This marking is done in the templet shop, thus eliminating this work at the machine and leaving the operator free for the actual operation of the machine.

"O-HI-O" Air-Hardening Die and Tool Steel

A high-carbon, high-chromium, air-hardening die and tool steel is being manufactured by the Colonial Steel Company, Pittsburgh. The steel can be hardened in still air from 1,825 deg. F. and shows a hardness of 602 Brinell in a section 6-in. square by 18-in. long. It may be used for body dies and complicated dies where still-air hardening to prevent warpage is necessary. The manufacturers claim for this steel no warpage and easy machinability. Uniformity in hardening is also claimed.

"Weldite" No. 18 "Yellow Jacket" Electrode

A welding rod for electric arc-welding which will weld ⅜-in. unbeveled plates clear through with one passage of the electrode from one side is being manufactured by the Fusion Welding Corporation, 103rd St., and Torrence Ave., a subsidiary of the Chicago Steel & Wire Co., Chicago. This electrode is especially manufactured for making heavy, mild-steel arc welds, and for that reason it is particularly adapted to plate welding in boilers, pipes and tanks. This rod is used in welding plates which are merely butted together, not beveled as in ordinary practice, and welding is done in one passage of the rod from one side of the piece.

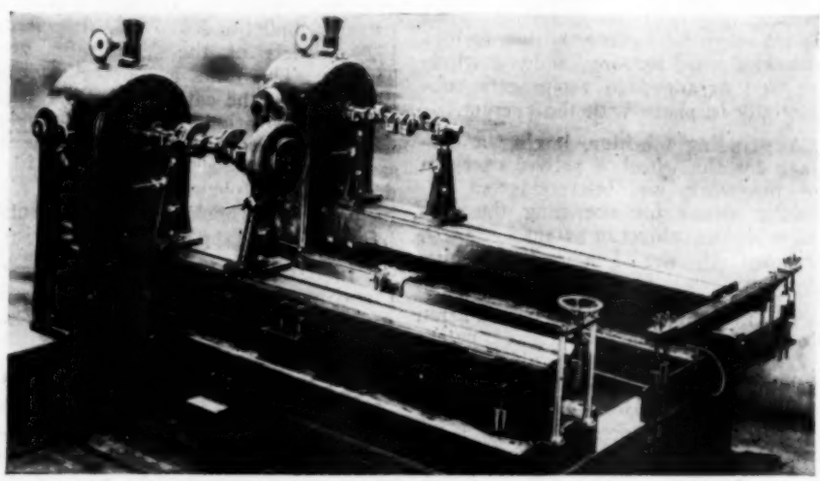
"Krupp-Losenhausen" Static and Dynamic Balancing Machines

EQUIPPED with magnetic means for counterbalancing the out-swing of unbalanced parts and thereby offering a simple and accurate method of determining the correction to be made, two "Krupp-Losenhausen" balancing machines, one of the static and one of the dynamic type, are being marketed in the United States by Alfred Suter, 200-5th Ave., New York, N. Y. The machines, as shown in the accompanying illustration, are sturdily constructed. They are guaranteed to be sensitive to 0.002 mm. deviation of the center of gravity from the rotating axis. Losenhausenwerk Dusseldorfer Maschinenbau, A. G. Dusseldorf-Grafenburg, Germany, is the maker.

The dynamic balancing machine consists of a heavy cast-iron base having a box section at the left containing the driving mechanism and indicating equipment, which shows the speed of rotation, and the amount and plane of unbalance. Drive of the work is effected by a variable-speed motor mounted in the base, being controlled by a rheostat through the large handwheel in the center of the casing. Belt drive from the motor to the work is used.

The large bed carries an oscillating frame that carries supports for the work. Spring support of the frame is used at the right-hand end, the spring being changed to suit the weight of the work being tested. The axis of the frame is at right angles to the axis of the test piece. A slide on the frame carries the movable supports. These are fitted with roller bearings for the work or ball-bearing centers as required. A special coupling is used between the work and the driving member.

The electric balancing device consists of a current breaking system and a double magnet for creating the magnetic field. This double magnet is attached to the oscillating frame. When the work is rotating at the critical speed, i.e., when the amplitude of vibration is the greatest, the electric balancing device is brought into play. The magnetic circuit is periodically broken at each half oscillation of the frame by means of an interrupter and produces a magnetic impulse. The position at which the impulse is made can be changed by moving the brushes on the slip rings of the interrupter. Balancing of the rotating part occurs when the outswing of the piece is offset by the magnetic impulse. The energy required to do this is easily determined. Thus the plane of unbalance and the amount are known. The magnetic impulses are governed so that at balancing they are directly opposite the heavy spot. The amount and plane of the unbalance are noted on the test piece and compensation is made after the test piece is removed.



"Krupp-Losenhausen" Balancing Plant

A scale shows the unbalance, while the distance between the axis of rotation and the point of weight application is indicated in centimeters. The weight to be applied equals the product of the couple divided by the distance from the axis.

The static balancing machine resembles to a great extent the dynamic machine. The axis of rotation of the frame in this case, however, is parallel with the axis of the test piece. The magnet coil as well as the static spring suspension device are mounted in the casing of the switch stand. The magnetic armature as well as the opposite end of the spring suspension are fixed at the bearing support of the oscillating frame.

The machine is built in three sizes, measuring out-of-balance from 75 to 10 kg., 200 to 15 kg., and 800 to 60 kg., respectively. The greatest lengths of pieces held are 1,000, 1,200 and 1,500 mm., and the greatest diameters, 500, 600, and 800 mm. The weights are 1,100, 1,400, and 2,000 kg., respectively.

"Oxweld" No. 21 High-Strength Bronze Welding Rod

A high-strength bronze welding rod with a low melting point is being marketed by the Oxweld Acetylene Company, a unit of the Union Carbide & Carbon Corporation, 30 East 42nd St., New York, N. Y. The rod may be used for bronze welding steel, bronze, brass, cast iron, malleable iron, wrought iron, copper, nickel, Monel metal, and similar metals. This material can also be used for building up wearing surfaces and for fusion welding of bronze, brass, and other copper alloys. The manufacturer claims for this rod a weld metal which gives a weld equal to and in many cases superior to the original metal from the standpoint of soundness, strength, and ductility. It is also claimed to be easy to apply and to have a composition which does away to a great extent with the fumes given off in welding operations with ordinary bronze welding rods. It melts rapidly, coats evenly, flows smoothly, and solidifies quickly. The rod is obtainable in the standard sizes and in standard-weight bundles.

REVIEW · OF · RECENT · PATENTS

Relating to the Machinery and Metal Products Industries

Processes

Method of treating steel bars by heating the bars approximately to their hardening temperature, slowly lowering their temperature to the critical point for the steel, and then slowly cooling the bars, is the subject of patent 1,724,031, assigned to the McKenna Process Company.

To the Wilcox-Rich Corporation has been assigned patent 1,724,282 on a method of making poppet valves by forcing the stem into a hole through the head, and thereafter welding these parts together under a pressure sufficient to upset the stem and form a shoulder under the head.

The process of moulding resinous condensation products, that consists in making a plastic material containing a heat-conducting metal powder and subjecting the material to heavy pressure in die elements, is covered by patent 1,724,501, granted to Gilbert Mombach, of Cincinnati, Ohio.

Patent 1,716,637 assigned to the Ford Motor Co. deals with a method of forming gears with chamfered teeth consisting of rough machining the gear to initially form the teeth, then heating the gear and striking it with a die to chamfer the teeth and then finish machining the gear teeth.

The heat treatment of alloys of aluminum-beryllium which consists in heating the alloy to a temperature slightly below the eutectic of the alloy to cause substantial solution of the undissolved beryllium and then quenching, is covered by patent 1,716,943 assigned to the Aluminum Company of America.

To the General Electric Co. has been assigned patent 1,717,220 relating to a method of treating metal parts which have been coated by immersion in liquid metal, by pouring these parts while still hot into a chute and applying an air blast at the upper end of the chute.

Metal-Working Machinery

To the Wheeling Stamping Co. has been assigned patent 1,724,914, on a casting machine having a plurality of molds, means for delivering metal to these molds in predetermined quantities and in timed relation, and means for closing the molds while the castings solidify.

Patent 1,725,300, assigned to The Waterbury Farrel Foundry and Machine Co., relates to a press having a plurality of blocks intermeshing with punch holders, as well as means for securing the parts so as to permit of their relative adjustment.

William B. Updegraff, of Elizabeth, N. J., has been granted patent 1,721,421, on a hydraulic press having a novel arrangement of platens and cylinders.

To the E. W. Bliss Co. has been assigned patent 1,716,414, relating to a power press comprising a frame, tubular slide, driving shaft, bearings in the frame, an eccentric within the slide, a punch head carried by the slide, means for operating the head by the eccentric and yielding means for drawing the head upward.

A rivet-setting machine involving a rivet holder and carrier, means for transferring the rivet from one to the other, a combined driver and anvil, a thrust sustaining member and means to position and clinch the rivet, is covered by patent 1,716,852 assigned to the Judson L. Thomson Manufacturing Company.

The McDonald Machine Co. is assignee of patent 1,719,230 covering a thread-rolling machine that combines a tool, turret wheel, work-placing members, turret drive clutch and other parts.

Clarence A Dix, of Detroit, Mich., has been granted patent 1,719,002 for a metal-forming machine with a number of pairs of forming members for folding sheet stock back on itself.

The Gleason Works is assignee of patent 1,725,431, covering a machine for cutting curved-tooth bevel gears. The machine has a drum with a baseplate mounted adjustably thereon, and supports a head with tools arranged to swing about different pivots on the head.

Patent 1,725,504, granted to Alberto Bettica, of Turin, Italy, relates to an electro-magnetic hammer with a spring-supported core surrounded by a winding and arranged to reciprocate substantially in phase with the current.

A grinding machine, having a carriage for the wheel, a second carriage for the work, and interconnected hydraulic means for operating the carriages, is the subject of patent 1,725,489, assigned to the Diamond Machine Company.

To the American Electric Fusion Corporation has been assigned patent 1,723,984, relating to a portable electric welding machine having flexible concentric conductors for supplying cooling fluid to the electrodes.

Two patents, 1,724,331—2, assigned to the Stewart Die Casting Corporation, relate to die-casting machines, one of which has opposed the carriers and other co-operating parts, and the second, a cam-operated core mechanism of novel design.

Ewald Röber, of Dusseldorf, Germany, has been granted patent 1,724,314 on a rolling mill of the Pilger type, having a hydraulic cylinder, reciprocable mandrel feed bar, and other co-operating parts in novel arrangement.

A scarfing machine for cutting the edges of metallic blanks preparatory to making a scarf joint, is the subject of patent 1,723,783, allowed to Geza Horvath, of Detroit, Mich. The machine has a tiltable rotary cutter, intermittent clamping means, and other co-operating parts.

The Keller Mechanical Engineering Corporation is assignee of patent 1,719,813, on a cam-cutting machine having a rotary cutter, electric tracer, rotatable cam spindle, profile template and other co-operating parts.

TRADE PUBLICATIONS

CHUCKS. The Skinner Chuck Co., New Britain, Conn., has published revised catalog No. 42 illustrating its line of lathes, drill and planer chucks, faceplate jaws, vises and other products. Each product is illustrated and phantom views add to the interest. Available sizes are listed. The catalog contains 66, 8 x 5-in. pages.

DRILLS. The Aurora Tool Works Division of the Oesterlein Machine Co., Cincinnati, Ohio, has issued a catalog illustrating and giving complete specifications for Aurora drill presses in all sizes from 20 to 44 in. The catalog has twelve 8½ x 11-in. pages.

HEATERS, UNIT. The American Blower Corporation, Detroit, Mich. has issued a bulletin No. 7818, describing 1929 models of the Venturafin unit heaters. The units are described and illustrated in the catalog, together with typical illustrations and such supplementary information as may be necessary for the prospective purchaser. Line drawings and phantom views are also included. The booklet contains twenty-four, 8½ by 11-in. pages.

TIE BINDING, METAL. The Gerrard Company, Inc., 1942 South 52nd Ave., Chicago, Ill., has issued a catalog on their "TA" metal tie binding method. The method is applicable to the binding of parcel post and light express packages and such uses are illustrated in the catalog. Illustrations of the various uses of the machine are shown in the illustrations. The booklet contains sixteen, 5½ by 8½-in. pages.

NEWS
OF THE WEEK

Technical Programs for Machine Tool Show Are Completed

More than 15,000 engineers and executives expect to attend biennial congress in Cleveland

TECHNICAL and other programs accessory to the biennial Machine Tool Show, in the Cleveland Public Auditorium, Sept. 30 to Oct. 4, are fully completed, according to announcement made through the Exposition management. Organizations which will participate in these several programs are the Machine Shop Practice Division of the A.S.M.E., the Production Committee of the S.A.E., and the Machine Tool Congress. All sessions will be held at the Hotel Cleveland. The first named group will hold sessions on Monday and Tuesday evenings, Sept. 30 and Oct. 1. George T. Trundle, president of the Trundle Engineering Co., will speak, on Monday evening, on "What Information Does the Machine-Tool Buyer Need from the Machine-Tool Salesman?" Dr. Zay Jeffries, Consulting Engineer of the General Electric Co., will speak on Tuesday evening on "The Present Status of Cemented Tungsten-Carbide Tools and Dies." The sessions on Wednesday and Thursday evenings, Oct. 2 and 3, will be under the auspices of the Production Committee of the S.A.E. On Wednesday evening, Prof. F. E. Raymond of Massachusetts Institute of Technology will speak on "Economic Production Quantities". On Thursday evening there will be a Production Forum, composed of a general symposium on four important topics in the automotive field, with general discussion under each subject. These four topics are: "The Application of Standard Machine Tools to Automobile Manufacture", "Results in Production Due to New Features in Machine Tool Construction", "Synchronizing Automobile Parts at the Assembling End", and "The Basis of Replacing Machine Equipment." On Friday evening there will be a dinner at the Hotel Cleveland.

Each exhibiting company in the show, which opens Sept. 30, has received an advance copy of the complete Exposition Directory which includes a detailed listing of all displays including its own. Some 244 separate displays, requiring up to as much as 3,000 sq.ft. for a single company's presentation of machines, will be included in the second national exposition sponsored by the National Machine Tool Builders' Association. Over 400 carloads of machines and machinery will be sent to Cleveland for the show. One company's exhibit requires seven cars.

Machine-tool executives, designers, and technicians who will be in attendance representing these exhibiting companies are expected to exceed 3,000 persons. A registered attendance from machine-tool-using industries throughout the United States and Europe, amounting to an additional 12,000 persons, is expected by the Association.

* * *

Fred H. Colvin to Attend Tokyo World Congress

FRED H. COLVIN, editor of *American Machinist*, is to be among the group of American engineers who will attend the World Engineering Congress which opens in Tokyo, Japan, on Oct. 29 and continues until Nov. 22. About 250 American engineers and their families have signified their intention of going on the *President Jackson* and the *Korea Maru*, the two boats which have been chartered for the trip. Mr. Colvin, following the Congress, will go to Korea and Manchuria to study the Southern Manchurian Railway and its shops, then to Peking, Shanghai, and Hongkong. From there he will go to Manila to see the power plants and sugar mill machinery plants, and thence on to Singapore and the Malay States. He will later travel through Australia, the Dutch East Indies, and New Zealand, visiting the railway shops and automobile assembly plants there.

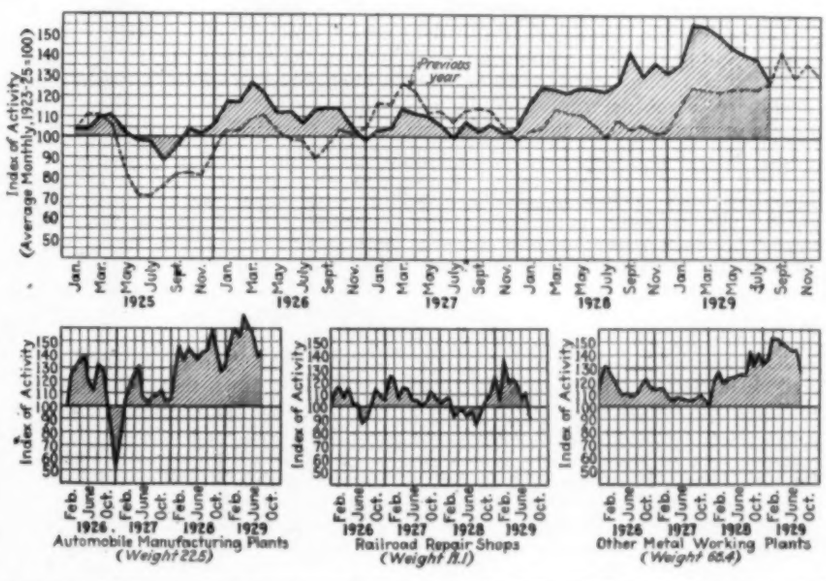
* * *

CONSOLIDATED Aircraft Corporation has received an order from the United States Army for 70 all-metal corps observation planes of the Thomas Morse type, it was announced recently by Major R. H. Fleet, president. The order included spare parts in quantity sufficient to bring the total up to the equivalent of 87½ planes. The total order aggregates $1,000,000.

* * * *

Seasonal Downward Trend Continues in Metal-Working Industries

DATA on the monthly consumption of electrical energy by the metal-working plants of the country indicate that the seasonal downward trend which started in May was continued through August, as has been the case in most previous years. The August rate of activity in the metal-working industry as a whole, after corrections are made for the number of working days, was



13.6 per cent under July, but was still slightly above the rate of operations reported during August of last year. Reports received since the opening of September indicate that a material increase in productive operations was witnessed following Labor Day, and it is fully expected that the rate of productive activities during September will be materially over that reported for August. A similar increase was witnessed during September of last year.

The automobile manufacturing industry, including the manufacture of parts and accessories, reported an increase in the rate of activity during August of 2.5 per cent compared with the rate in July. For the second consecutive month, the operations in these plants were under those of last year—the August rate of operations being about 0.1 per cent under August, 1928. Reports available for the first half of September indicate that the rate of operations for the month of September will show some increase over those for August, but will not be of the magnitude recorded during September of last year.

Preliminary data on the rate of activity in the metal-working branches, other than automobiles and railroad repair shops, show a material drop in the activities of these plants. Final figures will probably show a drop of around 6.5 per cent as compared with that of August, which rate of operations would still be some 6.6 per cent above that of August of last year. September will probably witness an upward trend of considerable proportions to meet the fall demand.

Railroad repair shops witnessed a decided drop in activity during August as compared with July, but operations were still some 4.8 per cent above August of last year.

* * * *

High Production Costs in France Create Market for Foreign Imports

Three factors combine to drown optimistic pretentions

By Our Paris Correspondent

THE dullness of trade, the vacation season, and the tangle at the Hague over the workings of the Young Plan for the liquidation of the German war debt have all tended to drown any optimistic pretentions which French industry might otherwise have expressed. France wants, or is willing to take, German coal on reparations account, but is not willing to take consumer goods. Great Britain, on the other hand, would like to sell more coal in France, imposing a contingent quota, as she has on Italy. France must pay cash for British coal. These, among others, are the economic difficulties which will affect French industry greatly during the next ten-year period while German reparations in kind continue.

The issue of American tariff revision has gone into the background for the moment, though the statement was made at a recent meeting of textile machinery manufacturers that in all big manufacturing lines the working of the American system was such that "French national production would be forced to lower prices or reduce output." The situation is obvious, even though certain exceptional industries, such as the automobile and electrical, seem to prove the contrary.

Fear is expressed that the American automobile assembly plants will prove a detriment to the development of the French industry. There are increasing numbers of American cars on French roads as a result of these plants, and France sees in this a flank attack on home industry, in spite of the fact that a fair amount of labor wage goes into the pockets of the French worker as a result, to say nothing of a very considerable taxation that goes into French government coffers.

French machine-tool constructors profess satisfaction with orders in hand and prospects, though present trade factors are feeble. Exports of machine tools have made a good showing during the first six months of the year, with figures about double of what they were two years ago. Since imports, chiefly from the United States and Germany, have followed a like scale of progression, the situation is not so brilliant as it might at first seem. French exports have been largely on wood working and metal-manipulating tools and machines rather than big production units, which France is still importing.

The French agricultural machinery industry shows increased production, likewise increased domestic and foreign sales, though during the past year imports have been increasing likewise, a changeover from the situation of two years ago.

The electrical machinery industry is prospering, owing to the quarter billion franc guarantee of the government for rural electrification in 1929.

Automobile output has been increasing steadily. Exports have increased lately and tentative plans of certain makers show confidence in the possibility of still further increases in foreign sales. In spite of this fact, imports of American cars are increasing, and it is a fact that French exports had fallen off immeasurably from what they were in 1925.

To balance the improved situation of exports in this line, imports during the first six months amounted to 4,707 units, chiefly from the United States and Italy. The French export was 22,480 units. The showing for the first half of the year is better than it was a year ago, but it is doubtful if it will hold up to the end of the year. Imports are likely to increase proportionately. The situation suggests, however, that French makers are seeking to reduce production costs in any way possible. The motorcycle industry, important in most European countries, appears to be stagnant here, with imports about equalling exports, a change from former days. It and the bicycle manufacturing industry are losing ground before the improved manufacturing methods of Germany and Great Britain. Many French firms are assembling foreign parts bought more cheaply than they can be manufactured.

There is but slight activity in locomotive and railway rolling stock, though the Nord Railway has distributed an order for 180 steel passenger cars among seven different makers.

The government has promulgated a law which permits foreign "materials" to be imported duty free for use in ship construction. This industry has reached a critical stage. The annual building capacity of French yards is nominally 250,000 tons, but it is not foreseen that there will be required more than 350,000 tons per year before 1950. There is little likelihood of the installing of any great amount of new equipment in tools and machinery save as replacements, even though it is claimed that many yards are anything but modern in their machinery installations.

There is complaint of a lack of disposition of French banking interests to aid industry in installing new machinery equipment. There are many old-line firms which might increase output at much more favorable production costs which lack the capital to further this end. The explanation is that the overbulging coffers of French banking institutions open far more freely in advancing credits to building schemes for solving the housing problem in that they immediately cover themselves by mortgage at favorable interests rates. The same building regime is making a new demand for electrical equipment, which is at all events developing various accessory branches of the machinery trades beyond the most optimistic dreams of pre-war days.

* * *

Soviet Russia Buys Two American Clock Factories

Soviet Russia is planning to manufacture the American dollar watch and the alarm clock. To manufacture watches and clocks of those and other types, the Soviet Precision Machinery Trust has bought the entire equipment and machinery of two American clock and watch factories. The factories purchased are the Ansonia Clock Company's plant at 397 Seventh Avenue, Brooklyn, and the Dueber-Hampden Watch Company's plant at Canton.

Railway Foremen's Associations Hold Meetings in Chicago

PAPERS covering lubrication, maintenance of electric and gas-electric locomotives, savings by modern shop production methods, planning of work in relation to the stores, maintenance of draft gear, and safety first, were presented at the 23rd annual meeting of the International Railway General Foreman's Association held at the Hotel Sherman, Chicago, Sept. 17 to 20. Over 250 railroad men registered at the meeting.

J. H. Armstrong, general foreman of the locomotive department of the Santa Fe Railroad and president of the association, presided at all the meetings. The initial address was made by A. R. Ayers, general manager of the New York, Chicago & St. Louis Railroads. He pointed out that the great speed and reliability which the railroads are demanding today is necessitating more efficient maintenance. In order to lower the cost of maintenance, he advocated the use of better materials and workmanship so that the length of time between shoppings would be longer. He also said that more use should be made of hardened and ground parts.

Several Reports Read

A report on inspection and lubrication in relation to long runs was read by A. H. Keys, of the Baltimore and Ohio Railroad. A report on repairing locomotives other than steam was read by M. A. R. Slack, of the New York, New Haven & Hartford. In this paper, the organization and methods used on this line for maintaining electric locomotives was outlined. In the discussion that followed, some of the problems relating to gas-electric rail-car maintenance were discussed. Because the use of this equipment is somewhat recent, few definite programs of maintenance have been developed thus far. Several shops, however, reported that they were equipped to handle such work as regrinding crankshafts, reboring cylinders, reseating valves, and the like.

Some of the savings obtained by modern shop-production methods were outlined by A. E. Iveson, of the New York Central. He showed how it was possible to adopt some of the mass production methods used in industrial plants to railroad shop work, and illustrated his paper by drawings of specific applications to milling machines. In the discussion, W. J. McCloskey, of the Illinois Central, described the progressive plan of freight car repairs used on his road. With this new method of spotting cars, production has been increased 60 per cent, and 15 to 21 cars go through the shop each day.

An unusual slant on mass production methods in the railroad shop was indicated by George T. Boon, of the Canadian National Railway, who indicated that there must be something wrong with the equipment if it was necessary to use mass production methods to maintain spare parts for it. Although one railroad indicated that it was getting extremely low repair costs per mile on equipment that averaged 27 years of age, the general consensus of opinion was that modern equipment is highly necessary, and that it is up to the foreman to convince the management with figures showing the advisability of replacing obsolete equipment when the time comes for the budget to be made up. Another point brought out was that milling machines seem to be favored over planing machines for certain operations on crosshead shoes and main-box wedges.

A report on draft gear inspection and maintenance was read by W. J. McCloskey. It was the feeling of the committee, which he represented, that a definite program of inspection should be worked out by the American Railway Association covering this phase of maintenance.

At the election of officers, H. B. Sunderman, of the Hocking Valley Railroad, was elected president for the forthcoming year. He will be supported by the following officers: First vice-president, A. H. Keyes, of the Baltimore and Ohio; second vice-president, C. Y. Thomas, of the Kansas City Southern; third vice-president, A. T. Streeper, New York, Chicago & St. Louis Railway; fourth vice-president, W. J. McCloskey, of the Illinois Central. J. H. Armstrong, retiring president, is now chairman of the executive committee, the other members being C. A. Barnes, H. E. Warner, J. A. Elliott and F. M. A'Hearn. Mr. A'Hearn was president a year ago.

INSPIRATIONAL talks by several higher mechanical executives of the railroads, together with some intimate discussions on tool practice in various shops, featured the seventeenth annual meeting of the American Railway Tool Foreman's Association, held at the Hotel Sherman in Chicago, Sept. 11 to 13. In conjunction with the sessions was an exhibit of tools in which 66 prominent member companies of the American Railway Tool Foremen's Supply Association participated.

Executives who addressed the gathering included E. B. Hall, supt. of motive power of the Chicago & North Western R.R.; C. M. House, supt. of M. P. and equipment of the Chicago & Alton R.R.; and J. A. Anderson, asst. supt. of M. P. of the Milwaukee Road. All three men stressed the importance of the tool foreman's job in furthering economical maintenance of shop equipment.

M. D. Chase, shop superintendent of the "Katy Lines," urged the adoption of mass production methods for certain railroad shop jobs. Necessity for modern machines and modern methods was a point brought out by W. R. Millican, of the "Katy Lines," retiring president, who reviewed the development of the toolroom, and showed how it could be organized most effectively. The only talk given by an outside individual was that by A. N. Goddard, of the Goddard & Goddard Co., Detroit, who spoke on Milling Cutters and Efficient Milling Practice, recommending that cutters be rotated in the direction of the feed.

A. A. Ferguson, Missouri-Pacific R.R., was elected president for the coming year. Other officers elected were: H. L. Taylor, Baltimore & Ohio, first vice-pres.; J. T. Jones, New York Central, second vice-pres.; D. L. Grady, Atlantic Coast Line, third vice-pres.; C. A. Shaffer, general supervisor of machinery and tools, Illinois Central, chairman of the executive committee. The remaining members of the committee are: E. J. McKernan, Santa Fe; J. E. Carroll, Chesapeake & Ohio; W. T. Davidson, Atlantic Coast Line; and L. C. Bowes, Rock Island. G. G. Macina, of the Milwaukee, was re-elected secretary-treasurer.

* * *

General Motors Buys Northeast Electric

Announcement of the sale of the Northeast Electric Co., Rochester, N. Y., to the General Motors Corporation, on Sept. 19, was made by W. A. Montgomery, president of the former company. The sale involved about $13,000,000, and marks the advent of General Motors into the electrical field, according to a statement by Alfred P. Sloan, Jr., president. The sale lends color to the recent rumor that General Motors is planning to manufacture radio sets under license of the Radio Corporation of America. Meanwhile, the Rochester plant of the Northeast company will continue production, but Mr. Montgomery and James J. Stafford, secretary of the company, will retire. Automotive and electric equipment will be manufactured at the plant.

* * *

A.S.S.T. Delegates Named for Tokyo Congress

Four prominent engineers have been named official delegates of the American Society for Steel Treating to the World Engineering Congress to be held in Tokyo, Japan, in October. Dr. George K. Burgess, director, U. S. Bureau of Standards, Washington, and past president of the Society; Ralph Modjeski, consulting bridge engineer, Chicago; Dr. Richard Moldenke, consulting metallurgist and specialist in cast and malleable iron, Watchung, N. J.; and F. F. Lucas, metallurgist and materials engineer, Bell Telephone Laboratories, New York, are the delegates named.

BUSINESS BAROMETER

Boom in stocks continues and some people believe America has discounted the hereafter as well as the future

By THEODORE H. PRICE
Editor, Commerce and Finance, New York

IN NEW YORK and most other large cities, the boom in stocks continues to be the subject of discussion wherever men are gathered together. Commenting upon it, a veteran trader recently remarked that we have discounted the hereafter as well as the future. There are some things in the situation which indicate that the public may be coming to share this view. As a matter of fact, the average price of the issues that have been active on the New York Stock Exchange and the New York Curb Market since the first of the year is now substantially below the top, and even the most popular favorites, such as United States Steel, are well under the highest prices touched since the 31st of December, 1928.

This fact was not generally appreciated until attention was called to it in these letters some two weeks ago. Since then the effervescence of the stock market has diminished, although occasional spurts are still being attempted in this, that, or the other group. But to this piping the public have latterly refused to dance, and it remains to be seen whether they can be induced to re-enter the market that gives so many evidences of having spent itself.

Then there is the question of undistributed securities. The *New York Times* of Sept. 17 publishes a striking article in which it is suggested that a large proportion of the brokers' loans, so-called, are being used to carry securities that have not yet been distributed. It is pointed out that new issues offered to the public during the month of August aggregated $751,000,000, or four times the offerings in the same month a year ago, and the question of whether we have reached a point at which the undigested security issues are likely to cause indigestion is raised.

Everyone must answer this question for himself, but the conscientious student of economic history would be recreant to his duty if he did not continue to point out that high interest rates do not, as a rule, stimulate business, and that 9 per cent money cannot be regarded as a permanently bullish influence.

But when we come to study the commercial and industrial phases of the present situation, it must be admitted that they seem to spell continued prosperity, in so far as the future can be described through the haze by which it is always obscured.

From this page the reader will get a quick picture of current business and industry. The boxed material below is a summary of the letters from regional correspondents of the American Machinist, published in full on the opposite page.

NEXT Week's Machine Tool Show has caused the quietness of business in machine-tool centers throughout the country during the past week. All indications point to a revival of business after purchasers have had an opportunity to look over the new types of equipment to be exhibited at the Show, and some dealers and manufacturers are suggesting that the Show be held only once every three years, rather than every second year.

NEW YORK'S business is lethargic, with the placing of a good-sized order for radial drills by the American Locomotive Co. the only exciting event of the week. Chicago business suffered a slight falling off, with the Show being considered as the cause, just as it is in other cities. Cleveland conditions remain unchanged. Detroit automotive manufacturers are also slowing up, but a good fall is expected. Cincinnati, Buffalo, and New England report a temporary lull, even though Cincinnati business is better than it was last year at this time.

GENERALLY speaking, orders for the past week have been for single items to be used for replacement or to maintain production schedules. Inquiries are a little better, but show the tendency of the purchasers to see the Show before they buy. Deliveries are about as they were, and prices have shown no change. Used tools are going reasonably well, but the demand for good used tools is still being felt.

Trade continues good. In some lines, it is running ahead of last year; in some others, it is slightly behind the record of 1928, but on the whole it is probably equal to last year, and with good prices for grain the West promises to be a liberal buyer of merchandise during the autumn. Most observers concede that fall and holiday retail trade will set a new high record. The trade in cotton goods is about up to expectation. Sales are probably equal to the presently curtailed production, and there is less complaint of excess stocks.

The steel industry, as well as the automotive industry, is a little less active than it was a month or two ago and will probably decline further before the year is out. But production is still well above last year's level, and there is nothing to indicate any permanent recession in either of these industries.

The action of the city of New York in committing itself to the construction of subways that will cost a total of $438,000,000 will provide employment for labor in the Eastern States for some time to come, and the announcement that eleven 20-hour trains will be put into service between Chicago and New York on Sept. 29 is cited as evidence of the demand for high-class traveling facilities.

The building industry shows little change as the autumn opens. Decreases in permits issued apparently foreshadow a decline, but large projects keep builders busy. Office rents are slightly higher in New York as a result of the congestion that has been caused by the demolition of many old buildings, and the displacement of their tenants. But many million cubic feet of new office and warehouse space will be available a year from now, and some are wondering whether it can be rented at the prices that are asked for at present. Similar conditions are said to prevail in many of the larger cities where skyscrapers are under construction.

Sugar has turned easier since distributors covered their requirements until about October 1 and the European beet crop received needed rains. Rubber is firmer on reduction of tire inventories. But in commodities as a whole, the present price trend seems mostly sidewise and there is no sign of the inflation expected by some.

The week's news from Europe and the Far East is without any very direct bearing upon American business. Perhaps it is not too much to say that the whole world is marking time politically while it awaits the conference between President Hoover and Premier MacDonald that will be held in Washington early in October.

Viewed from an economic standpoint alone, a realization of his dream would be the most bullish influence that can be imagined, but it will take time to transmute the ideal into the material.

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THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine-tool business

THE following reports, gathered from the various machinery and machine-tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

CLEVELAND

Business conditions remain unchanged in the local machine-tool industry. The dullness of the last month still prevails, with buying confined to actual necessities. Inquiries have dropped off, and are mostly for single tools or small lots. A great deal of business is pending; prospective buyers are waiting to view the exhibits at the Show before closing orders.

Some stimulus was noticed as a result of the recent Steel Treaters' show. Local exhibitors obtained a satisfactory amount of business is pending; prospective buyers chasers.

Production schedules are being eased off. A few of the producers are weeding out workmen and curtailing night shifts. The only bright spot for the past two weeks has been the increase in the construction of new factory buildings and additions. Continued activity in the steel plants of the Mahoning Valley district is reported.

CHICAGO

With a few exceptions, reports from selling agents and dealers in machine tools are to the effect that there has been a slight falling off in business within the last ten days, not only in the matter of bookings, but also in inquiries. The general tone of the market, however, is said to be satisfactory, and such recession as has been noted is not expected to continue for any length of time. The opinion is expressed, practically with unanimity, that following the Machine Tool Builders' Show at Cleveland there will be a decided reaction in the market. Just at present there is an apparent lull. Railroad buying is limited to single tools and small lots in the main. Large industrialists are not buying as freely as during August and July. Inquiries from the International Harvester Co., one of the leading factors in the market until recently, are principally for subsidiary shop equipment. The Pullman Co. is reported to have a number of items still outstanding on its lists. Orders coming in at this time are from scattered sources, and to a large extent, for tools of the smaller type. Demand for used tools is fairly good. Reports regarding deliveries indicate that there is a slow perceptible improvement.

NEW YORK

The purchase of the Northeast Electric by General Motors as the latter's entry into electrical manufacturing and the placing of a good-sized order for radial drills by the American Locomotive Co., were the only unusual events of the past week in the machinery and machine-tool industry in the New York district. Business is continuing its lethargic progress toward the National Machine Tool Builder's Exposition next week, and all indications point to a maintenance of the present conditions until visitors at the Congress have an opportunity to think over what they see there. In fact, there is some talk of holding the Exposition only once in three years, instead of every second year. Even prices, deliveries, and inquiries are sharing the general lethargy, and are showing little tendency to change one way or the other. There is some expectation, however, that deliveries will soon be improved, owing to the approach of cooler weather and consequent better working conditions in the shops.

While some dealers report last week as better than the preceding one, others report it slower, and the general average remains about where it was. The past week's business of the Triplex Machine Tool Co., is an example of the week's business among the more fortunate companies. Triplex reports sales as follows: 2 Swiss jig borers, 1 Fosdick radial drill, 3 Springfield lathes, 1 Frew profiling machine, 1 Boley multiple drill, 1 Edlund sensitive drill, 2 floor grinders, a list of 11 tools of good size.

BUFFALO

There has been little improvement in actual business among the machine-tool dealers of the Buffalo district, although conditions grew better after the middle of September. A noticeable pick-up in the number of inquiries for equipment occurred directly after the middle of the month, but dealers became resigned to the belief that there would probably be little increase in actual orders until after the first of October.

The impression is more pronounced than two weeks ago that some purchasers are waiting until after the Cleveland show before they make purchases. On the other hand, there are some dealers who believe that the impending show is having little or no effect on purchases of regular, standard equipment, but may be influencing the plans of those buyers who are in the market for special equipment. At any rate it is expected that there will be a great increase in buying during October.

When buying is renewed on a large scale, both in the electrical and the machine-tool field, it is bound to come from a wide variety of industries. Requirements for the aircraft industry seem to have been largely filled for the year.

CINCINNATI

Taking the industry as a whole, the machine-tool manufacturers of the Cincinnati district booked a good volume of business in the past week, and also received a large number of inquiries. In nearly all cases it is estimated that when the books are closed for the present month they will show a gain over the previous month, as well as over the corresponding month of the previous year. A very small number reported a slight slowing up of business in the week, but this was regarded merely as a temporary lull and of no significance.

In speaking of the coming machine-tool exposition, one member of the trade explained that, in his opinion, it is causing almost no postponement of purchases. "Our experience is that the great majority of machine-tool users are buying what they need, and only a small percentage are waiting to see new developments," he stated.

Selling agents report the receipt of a good volume of orders from local and adjacent territory during the past week, and state that they have noted no retarding of business because of the coming exposition. "For quite a while, business has been showing a marked tendency to become more even," commented one member of this branch of the trade. "That is, there are fewer peaks and valleys in the sales curve, and there is a steadier in-flow of business."

NEW ENGLAND

September machine-tool sales in the New England territory have thus far come up to expectations. The current week, however, has been quiet, although a good business in small machine units and hand tools was reported. No exceptional transactions were noted. Inquiry is brisk for both domestic and foreign requirements, indicating placement of attractive orders for an extended period. Foreign business is promising and heavy exports of automatic screw-machines, lathes, and grinders are anticipated.

Small-tool manufacturers are sold far ahead. Used-equipment houses have a ready market for all popular makes of machines in good condition, but are still hampered by small stocks in these lines. Prices are favorable to sellers. Contract shops are busy on back logs with some already showing renewals of orders for early year shipments.

Airplane manufacturers continue to be the outstanding buyers in this section, particularly in Connecticut. A single manufacturers in this field has already placed orders for machine tools running into three-figure valuations, and other orders are to follow from time to time.

MILWAUKEE

Tool distributors report a larger volume of business completed during the past fortnight than during the first half of August, or in the corresponding period of 1928. The volume of inquiries also shows a steady increase, but a large number of sales will not be closed until after the Cleveland exposition which will be well attended by men from this section. An indication of even greater activity in the metal trades is seen in the fact that pattern shops are now reported to be operating at full capacity, although the foundries have not yet felt the effect of this revival.

Makers of special equipment for mills and shops continue to report that they are experiencing the greatest demand in years and that it is still difficult to secure competent machinists, toolmakers and diemakers. While demand from automobile manufacturers is light and local automobile production has fallen off considerably, stamping mills and foundries making parts for eastern manufacturers are working on contracts that call for almost full capacity output. Tractor and implement manufacturers have been operating at full capacity and are making inquiries for additional equipment.

Consolidation in the outboard-motor industry has not yet resulted in expected orders, although these plants usually plan heavy production in mid-winter for the spring trade. Delivery of machine tools has been slightly expedited on certain items. Collections have been slowed up slightly because of high loan rates but the credit situation otherwise continues better than in recent years.

DETROIT

Conditions in the Detroit area are uncertain this week and orders for machinery have been fewer and of less importance than during the first part of September. There is a strong feeling of optimism throughout the machinery and machine-tool trade, but the orders now being received do not justify this attitude.

Most of the larger automotive manufacturers and most of the machinery dealers

are convinced that the next three months will be productive of a great deal of business. Automobile and accessory manufacturers are making plans that will involve the purchase of a large volume of machinery, tools, dies, and general equipment between now and the end of the year. A large number of changes are being planned and many are now in advanced stages of development. There is a noticeable tendency on the part of prospective purchasers to withhold their orders until after the show in Cleveland next week and it is generally agreed here that a great many orders will probably be placed at the Show and in the weeks immediately following.

Many of the shops doing contract jobbing work here are busier than they have been in many weeks and this is considered an indication that substantial programs for expansion are being developed by the larger manufacturers.

Automobile production during the past few weeks has not been good. Many of the plants are slowing up and at present there is great deal of unemployment. Conditions were so favorable during the first seven months that this situation is particularly noticeable now. General business conditions are only fair and observers are of the opinion that there will be little immediate improvement.

Business Items

Changes in the management of the B. F. Goodrich Co., Akron, Ohio, were announced recently by Pres. James D. Tew. They are intended to centralize responsibility and to increase efficiency. J. H. Connors, former president of the Republic Rubber Co., at Youngstown, has been made general manager of the mechanical division, T. G. Graham, first vice-president, becomes head of the tire division. T. B. Farrington, formerly superintendent of the footwear department and director of engineering, has been appointed chief of the factory service division. H. C. Miller is to be in control of original equipment business. J. W. Schade will be in charge of the research laboratories.

The Leader-Koolstack boilers and heating units, manufactured by the Leader Iron Works, Decatur, and the Sundstrand Machine Tool Co., Rockford, Ill., will be marketed through the Leader Boiler and Heating Co., 310 South Michigan Ave., Chicago, organization of which was perfected this week. T. E. O'Brien, former general manager of the Leader Iron Works, has resigned that position to devote his entire time to the activities of the marketing organization and C. R. Walmsley has been named his successor.

The Oakland Motor Car Co. has recently completed the establishment at Oakland, Calif., of a new parts depot in which will be kept a stock of Oakland-Pontiac parts for distribution to dealers of the Pacific Coast region. R. H. Armstrong, service manager for the Oakland Motor Car Company, has been placed in charge of the new depot.

The Blaw-Knox Co., which recently absorbed the Union Steel Casting Co., the Pittsburgh Rolls Co., the Lewis Foundry & Machine Co., and the National Alloy Steel Co., has announced the election of six new directors, bringing the total membership of the board to 22. The new directors are: J. P. Allen, Frank Cordes, J. R. Dunsford, D. L. Eynon, S. H. Church, and C. M. Thorp. Frank Cordes continues as president of the Lewis Foundry & Machine Co., and has also been elected a vice-president of the Blaw-Knox Co. A. C. Lehman, president of the Blaw-Knox Co., becomes chairman of all subsidiary companies.

The Toledo Steel Products Co., Toledo, Ohio, has purchased a controlling interest in the Fostoria Screw Co., Toledo. There will be no change in the operating personnel of the company, V. C. Crawford and J. E. Adams remaining in their present capacities as general manager and sales manager, respectively. E. R. Pillars will remain as general manager of the Fostoria Screw Co. L. W. Karg who has been assistant to Mr. Pillars is to be in charge of operations at the Fostoria plant.

Dominion Bridge Co. officials intend to award a contract shortly for the firm's proposed $1,500,000 steel fabricating plant at Burnaby, British Columbia, and that work will be expedited to complete the first unit by the end of March, 1930. It is understood the company plans to spend ultimately $5,000,000 on this undertaking. The plant, which will be equipped with electrically operated machinery, is expected to employ approximately 250 men.

The Wagner Electric Corporation, St. Louis, Mo., has established a branch sales office at 734 Allen Building, Dallas, Texas, in charge of Alfred B. Emrick. This branch will serve the state of Texas, and parts of Louisiana and Arkansas. J. B. Holston has been appointed manager of the St. Louis sales office of the company, being transferred from the Chicago sales office.

The Bucyrus-Erie Co., South Milwaukee, Wis., is acquiring the plant at Lincoln, England, of Ruston & Hornsby, Ltd., European manufacturer of dirt-moving machinery, oil engines, boilers and tractors. William W. Coleman, president and chairman of Bucyrus-Erie, will be chairman of the board of the English concern, and Roger Newberry, manager of foreign sales for the American concern, will be director of sales for the British organization.

The Valley Forge Steel & Tool Co., Chicago, of which C. Avildsen is president, has bought the seven-story building at 100-108 South Jefferson St., the ground floor of which is occupied by the H. E. Barton Tool Co. and the A. M. Stoehr Machinery Co. The latter two concerns will remove to the third floor of the building, which will be taken over by the Valley Forge Co. on November 1.

The Keystone Drawn Steel Co., Spring City, Pa., is erecting a new building 40x200 ft., and enlarging and re-equipping other buildings of the plant. The president of the company is W. N. Lynch; vice-president and general manager, J. J. Komara; vice-president and general sales manager, A. J. Kinnucan.

Construction of a new foundry building will be begun some time this fall by the Haynes Stellite Co., Kokomo, Ind., according to E. P. Gormely, general manager of the company. The new building will be north of the present plant. The expansion program also will include the erection of a warehouse extension.

Contracts have been let for the construction of a $100,000 addition to the plant in Fort Wayne of the Tlkheim Oil Tank & Pump Co. The new building will be L-shaped with one part 80x750 ft. and the other 88x160 ft. In addition, the general offices of the company will be enlarged.

E. Edelman & Co., Chicago, have effected a merger with W. F. Martin, Inc., and have bought the two-story factory building at 2332-56 Logan Blvd., Chicago. The combined organization will continue under the name of E. Edelman & Co., with no change in general policy.

The Carolina Motor Parts Co., 200 N. College St., Charlotte, N. C., opened for business the middle of September as distributors in the North Carolina district of standard automotive parts and garage machinery and tools. The firm is composed of E. M. Branch and M. H. Fraser, formerly with the Genuine Parts Co., Atlanta.

The Beloit Iron Works, Beloit, Wis., will add 1¼ acres to the present plant on an island in Rock River at Beloit at a cost of $50,000 if federal officials approve the plan to dredge out an island near the plant and deposit the earth behind a seawall at the main plant. City authorities have approved the proposal.

The A.B.C. Manufacturing Co., 221-223 South Fourth St., Quincy, Ill., has taken over the plant formerly known as B. Barmeier, and will enlarge and re-equip it to handle small contract manufacturing and specialties.

The LaCrosse Plow Co., LaCrosse, Wis., is being absorbed by the Allis-Chalmers Manufacturing Co. The LaCrosse plant was established in 1893, and comprises ten buildings with eight acres of floor space.

The Gluntz Brass Foundry Co., 10803 Harvard Ave., Cleveland, O., has awarded the contract for the construction of a new machine shop.

The Champion Machine & Forging Co., 3695 E. 78th St., Cleveland, Ohio, has began the first unit of a $600,000 addition to its plant in that city.

The Hill-Curtis Co., Kalamazoo, Mich., has changed its name to the Hammond Machinery Builders, Inc.

The United Iron & Metal Co. is building a plant, shop, and offices at 457 Fifth St., Milwaukee.

Personals

RALPH S. COOPER, vice-president and general manager of the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill., has been elected president to fill the vacancy caused by the death of John D. Hurley on Aug. 15. Mr. Cooper was elected at a special meeting of the board of directors, held on Sept. 12, in Chicago. Mr. Cooper has been associated with the company for the past 26 years. He was graduated from Cornell in 1903 as a mechanical engineer, and immediately joined the Hurley forces.

D. C. TRAVIS, general superintendent of the plant of the Simmons Co., manufacturer of metal beds, has resigned after finishing his twenty-seventh year in its service. G. A. SMITH, general production superintendent, will succeed Mr. Travis, FRANK B. HARMON will be promoted to general production superintendent, and PHILLIP HARMON, JR., to assistant superintendent.

HIBBARD S. GREENE, formerly vice-president in charge of sales for the Barber-Greene Co., Aurora, Ill., has become assistant to the president of the Chain Belt Co., Milwaukee, and assumed his new duties Sept. 16. Mr. Greene resigned from the Barber-Greene Co. last spring and returned recently from a three-month tour of England and the Continent.

A. M. LEVERICH, Wisconsin representative of the Abrasive Co., has resigned to become general manager of the new eastern plant being completed at Camden, N. J., by the Rundle Manufacturing Co., Milwaukee. J. D. BUCKLEY, Birmingham, Ala., succeeds Mr. Leverich at Milwaukee.

G. G. JETER, manager of sales of the transformer accessory section of the General Electric Co. at Pittsfield, Mass., has been named manager of power apparatus sales of the newly consolidated General Electric Supply Corporation. His headquarters will be at Bridgeport, Connecticut.

W. R. FISHER, president of the Universal Engineering Co., Frankenmuth, Mich., will operate his privately-owned plane between Saginaw, Flint, Pontiac, and Cleveland during the week of the National Machine Tool Show as a service for customers and prospects.

CHARLES F. GLORE has been elected a director of the American Brake Shoe & Foundry Co., New York, to succeed GEORGE M. JUDD, recently resigned. Mr. Judd will continue as secretary.

H. O. K. MEISTER has been appointed assistant general manager of the Hyatt Roller Bearing Co., Newark, N. J., according to an announcement of H. J. Forsythe, president and general manager. Mr. Meister has served as assistant general sales manager and later as general sales manager of the Hyatt Co. since 1925. Prior to that time, he was manager of the Western Division of the company in Chicago. He has been associated with Hyatt for over fifteen years.

J. H. ANDERSON, formerly connected with the Mount Vernon Car Manufacturing Co., Mount Vernon, Ill., has been appointed foundry superintendent of the Litchfield Manufacturing Co., Waterloo, Iowa.

FRANK L. HAMBLY, export manager of the Marmon Motor Car Co., Indianapolis, sailed recently to attend this year's international automobile shows in London and Paris.

SIR HENRY W. THORNTON, chairman and president of the Canadian National Railways, has been elected a director of the Royal Bank of Canada.

LANE MCLEAN has been appointed vice-president and general manager of the Lidgerwood Manufacturing Co., Elizabeth, N. J.

GEORGE D. COLBURN, manager of the aluminum division of the Club Aluminum Co., Chicago, has been elected a director, replacing H. N. Selling.

JAMES A. CAMPBELL, president of the Youngstown Sheet & Tube Co., was recently feted by friends on the occasion of his birthday.

CARL E. SOMMER has been elected president of the Majestic Stove Manufacturing Co., St. Louis, after 34 years of service.

CYRUS S. EATON has purchased the controlling interest in the Donner Steel plant, Abbot Road, Buffalo. The stock was formerly held by Wm. H. Donner.

JAMES G. PATTILLO, JR., has been appointed manager of the Pittsburgh branch sales office of the Wagner Electric Corporation.

Obituaries

GEORGE W. THOMPSON, mid-west district manager of the Norton Co., Worcester, Mass., died recently in Chicago after a brief illness. He had been connected with the Norton Co. for 31 years. Since 1915, he had been employed as district manager for the grinding wheel division, with headquarters in Chicago.

FRED H. RINDGE, JR., Executive Secretary of the Industrial Department of the National Council of the Y.M.C.A. and a writer and lecturer on industrial questions, died in Montclair, N. J., on September 14, after an operation. Mr. Rindge was 43 years of age.

RAY P. MCGRATH, for 15 years manager of the San Francisco office of the Sullivan Machinery Co., Chicago, died recently. He had been associated with the company since 1906, having been identified with the New England sales office at Boston prior to 1914.

CAPT. WILLIAM M. S. JACKSON, New York, automotive engineer and inventor, died in Philadelphia on Sept. 10 from bronchial pneumonia. He was 49 years of age. Capt. Jackson came to this country from Scotland. He was in active service under the British flag during the World War, and in the latter part of it represented the British government in this country in connection with war contracts.

HIRAM M. DAVIS, one of the first to engage in the business of electroplating in Milwaukee in 1875, a few years after the process was invented, died at his home in Milwaukee, Sept. 10, at the age of 77.

WALTER A. WINDSOR, president of the Marietta Mfg. Company, Point Pleasant, W. Va., died Aug. 20 in Cincinnati.

Forthcoming Meetings

MACHINE TOOL BUILDERS EXPOSITION. Under the auspices of the National Machine Tool Builders Association, Sept. 30 to Oct. 4, in the Public Auditorium, Cleveland, Ohio. Ernest F. DuBrul, general manager, 1415 Enquirer Bldg., 617 Vine St., Cincinnati.

NATIONAL SAFETY COUNCIL. Eighteenth annual meeting, to be held in Stevens and Congress Hotels, Chicago, Sept. 30 to Oct. 4. William H. Cameron, 108 East Ohio Street, Chicago, is managing director.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Machine Shop Practice Division meeting in conjunction with the Production Division of the S.A.E. during the National Machine Tool Congress, Cleveland, Ohio, Sept. 30 to Oct. 4. Calvin W. Rice, 29 W. 39th St., New York, is secretary.

SOCIETY OF AUTOMOTIVE ENGINEERS. Production meeting at Hotel Cleveland, Cleveland, Ohio, Oct. 2 to 4. Coker F. Clarkson, 29 West 39th St., New York, is secretary.

GRAY IRON INSTITUTE—Annual meeting, Hotel Cleveland, Cleveland, Ohio, Wednesday, Oct. 16. Information may be obtained from Arthur J. Tuscany, manager, Terminal Tower Building, Cleveland.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Regional meeting, Akron, Ohio, Oct. 21 to 23. Calvin W. Rice, 29 W. 39th St., is secretary.

SOCIETY OF INDUSTRIAL ENGINEERS. Sixteenth national convention at Hotel Statler, Cleveland, October 23 to 25. Requests for programs should be sent to S.I.E. national office, 205 West Wacker Drive, Chicago.

AMERICAN GEAR MANUFACTURERS' ASSOCIATION. Semi-annual fall meeting at the Benjamin Franklin Hotel, Philadelphia, October 24 to 26. T. W. Owen, secretary, 3608 Euclid Ave., Cleveland.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS — Annual meeting, New York, Dec. 2 to 6. Headquarters will be at 29 W. 39th St., New York City. Calvin W. Rice is secretary.

THE WEEKLY PRICE GUIDE . . .

Rise and Fall of the Market

THE rate of operations at steel mills is tapering off gradually, leaving possibilities of a surplus of iron. Pig iron and steel prices, nevertheless, continue firm and unchanged. Construction and railroads form the two main outlets for the current steel output. Other consuming lines appear to be quieting down but not to a point below the seasonal volume. Most of the non-ferrous metals declined during the week. Solder is down ¼c. per lb. (33c.) and genuine, highest grade babbitt metal declined 1c. per lb. (64c.) at New York warehouses. Linseed oil continues to fluctuate violently, although the current quotation of 17.1c. per lb., f.o.b., New York, in 1 to 4 bbl. lots, is but 0.1c. below last week's market.

(All prices as of Sept. 20, 1929)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b:

CINCINNATI	
No. 2 Southern (silicon 1.75@2.25)	$17.69@$18.19
Northern Basic	19.90
Southern Ohio No. 2	19.90
NEW YORK—Tidewater Delivery	
No. 2 Southern (silicon 1.75@2.25)	19.50
BIRMINGHAM	
No. 2 Foundry (silicon 1.75@2.25)	14.00@14.50
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	21.26@21.76
Virginia No. 2	24.04
Basic	19.75@20.25
CHICAGO	
No. 2 Foundry, local (silicon 1.75@2.25)	20.00
No. 2 Foundry, Southern (silicon 1.75@2.25)	20.01
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	20 26
Basic	20 26
Bessemer	20.76

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb:

Detroit	4.50
Cleveland	5.00
Cincinnati	4.50
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.10@2.20	3.35	3.30	3.90†
No. 12	2.15@2.25	3.45	3.35	3.95†
No. 14	2.25@2.35	3.55	3.45	4.00†
No. 16	2.35@2.45	3.65	3.55	4.10†
Black				
Nos. 18 to 20	2.65	3.85	3.70	3.80
No. 22	2.80	4.00	3.85	3.95
No. 24	2.85	4.05	3.90	4.00
No. 26	2.95	4.15	4.00	4.10
No. 28	3.10	4.75	4.15	4.25
Galvanized				
No. 10	2.80@2.90	4.20	4.05	4.05
Nos. 12 to 14	2.90@3.00	4.30	4.15	4.15
No. 16	3.00@3.10	4.40	4.25	4.25
No. 18	3.15@3.25	4.55	4.40	4.40
No. 20	3.30@3.40	4.70	4.60	4.55
No. 22	3.35@3.45	4.75	4.65	4.60
No. 24	3.50@3.60	4.90	4.75	4.75
No. 26	3.75@3.85	5.15	5.00	5.00
No. 28	4.00@4.10	5.40	5.25	5.25

*Light plates. †Up to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Galv.
1 to 3 in., butt welded	50%	36%	55½%	43½%	54%	41%
2½ to 6 in., lap welded	45%	32%	53½%	40½%	51%	38%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
4½	1.27	5.0	4.506	.247
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb:

Thickness—Decimal Fractions	B.w.g. and	Outside Diameter in Inches—Price per Foot ⅛	¼	⅜	½	1	1¼	1½
.035"	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049"	18	.17	.18	.19	.20	.21	.23	.25
.065"	16	.19	.20	.21	.22	.23	.25	.27
.083"	14	.20	.22	.23	.24	.25	.27	.29
.095"	13	.21	.23	.25	.26	.27	.29	.31
.109"	12	.22	.24	.26	.27	.28	.30	.32
.120" or .125"	11	.23	.25	.27	.28	.29	.31	.33
.134"	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse base prices in cents per lb:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	4.25†	4.00	4.15
Cold rolled strip steel	6.25	6.00	6.10
Floor plates	5.10†	5.30	5.00
Cold drawn, round or hexagon‡	3.60	3.65	3.60
Cold drawn, flat or square‡	4.10	4.15	4.10
Structural shapes	3.30†	3.00	3.10
Soft steel bars	3.30†	3.00	3.00
Soft steel bar shapes	3.30†	3.00	3.00
Soft steel bands	3.75†	3.65	3.65
Tank plates	3.30†	3.00	3.10
Bar iron (2.75 at mill)	3.25	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, $\frac{3}{16}$-in. thick. †Up to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse— $\frac{3}{32}$, 8.35c. per lb.; ⅛, 7.85c. per lb.; $\frac{5}{32}$ to ½, 7.35c. per lb.

METALS

Warehouse Prices in Cents Per Pound for Small Lots:

Copper, electrolytic, New York			19.25
Tin, Straits, pigs, New York			47.50@48.50
Lead, pigs, E. St. Louis	6.70	New York	7.62½@8.12½
Zinc, slabs, E. St. Louis	6.75	New York	7.75@8.25

	New York	Cleveland	Chicago
Antimony, slabs	11.00@11.50	11.25	14.50
Copper sheets, base	27.75	27.75	27.75
Copper wire, mill, base	20 12½	20.12½	20.12½
Copper, drawn, round, base	26 25	26 25	26.25
Copper tubing, base	2 25	29 25	29.25
Brass sheets, high, base	2 25	23.25	23.25
Brass tubing, high, base	2 25	28.25	28.25
Brass rods, high, base	21.25	21.25	21.25
Brass wire, high, base	23.75	23.75	23.75

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%.....	25@26	24.30	24.30
Zinc sheets (casks).....	10.50@11.00	11.70	10.11
Solder (½ and ½).....	33.00	32.75	31@34
Babbitt metal, delivered in case lots, New York, cents per lb:			
Genuine, highest grade.....			64.00
Commercial genuine, intermediate grade.....			48.00
Anti-friction metal, general service.....			31.50
No. 4 babbitt.....			12.00

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va:

	Nickel	Monel Metal
Sheets, full finished.....	52.00	42.00
Sheets, cold rolled.....	60.00	50.00
Strip, cold rolled.....	55.00	45.00
Rods, hot rolled.....	45.00	35.00
Rods, cold drawn.....	53.00	40.00
Tubing	75.00*	90.00†
Angles, not rolled.....	50.00	40.00
Plates.....	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars, depending on quantity offered for sale:

	New York	Cleveland	Chicago
Crucible copper.....	15.50 @15.75	13.50	13.00 @14.00
Copper, heavy, and wire..	14.75 @15.75	13.00	12.00 @13.00
Copper, light, and bottoms	13.00 @13.50	12.50	11.00 @12.00
Heavy lead.....	5.62½@ 5.87½	6.25	4.75 @ 5.25
Tea lead.....	4.00 @ 4.25	4.25	3.75 @ 4.25
Brass, heavy, yellow.....	8.50 @ 9.00	8.00	8.00 @ 8.50
Brass, heavy, red.....	12.00 @12.50	12.50	11.75 @12.25
Brass, light.....	7.25 @ 7.75	7.50	7.00 @ 7.50
No. 1 yellow rod turnings.	9.75 @10.25	9.00	9.00 @ 9.50
Zinc.....	3.25 @ 3.50	3.25	3.00 @ 3.25

TIN PLATES—Charcoal—Bright—Per box:

	New York	Cleveland	Chicago
"AAA" Grade:			
IC, 14x20.....	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20.....	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20.....	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20.....	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.*	$0.10@0.13½	$0.16	$0.15
Cotton waste, colored, per lb.*	.09@ .13	.12	.12
Wiping cloths, washed white, per lb.†.....	.16	38.00 per M	.16
Sal soda, per lb.....	.02½	.02	.02
Roll sulphur, per lb.....	.027	.03½	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.....	.171	....	173
Cutting oil, about 25% lard, in 5 gal. cans, per gal.....	.75	.60	.65
Machine oil, medium-bodied (55 gal. steel bbl.) per gal..	.33	.36	.24
Belting — Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin. ft., per inch of width, for single ply:			
Medium grade.....	30–10%	30–10%	35%
Med. grade, heavy wgt...	30%	30– 5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft:			
First grade.....	50%	50–10%	50%
Second grade.....	60%	60– 5%	50–10%

*All waste in bale lots. †100-lb. bales.

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars.....	per lb..	$0.033	$0.0325	$0.0325
Cold drawn shafting...	per lb..	.036	.036	.034
Brass rods.....	per lb..	.2125	.2125	.17
Solder (½ and ½).....	per lb..	.33	.3375	.3225
Cotton waste, white...	per lb..	.10@.13½	.10@.13½	.10@.13½
Disks, aluminum oxide mineral, cloth, No. 1, 6-in. dia.....	per 100.	3.60	3.60	3.05
Lard cutting oil.....	per gal.	.75	.75	.65
Machine oil.....	per gal.	.33	.33	.30
Belting, leather, medium.....	off list..	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs...	off list..	50-10%*	50–10%*	50%*

*List prices as of April 1, 1927.

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper.....	$4.86	$4.29	$4.29
Emery cloth.....	22.93	20.97	20.97
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper.....	2.08	2.04	2.04
Cloth.....	3.60	3.59	3.59
Fire clay, per 100 lb. bag.....	1.00	.75	.75
Coke, prompt furnace, per net ton.....		Connellsville,	2.65
Coke, prompt foundry, per net ton.....		Connellsville,	3.75
White lead, dry or in oil...	100 lb. kegs....	New York,	13.75
Red lead, dry.....	100 lb. kegs....	New York,	13.75
Red lead, in oil.....	100 lb. kegs....	New York,	15.25

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less.....	60%
Larger, up to 1 x 30-in., full kegs, list less.....	50–10%
Less than full kegs or case lots, add to list.....	10%
Fitting-up bolts: list less.....	45%
Lag screws:	
Up to ½-in. x 6-in., list less.....	60%
Larger, list less.....	50–10%
Less than full keg or case lots, add to list.....	10%
Rivets:	
Structural, round head, full kegs, net.....	$4.50
Structural, round head, broken kegs, net.....	6.00
Tank, $\frac{7}{16}$-in. dia. and smaller, list less.....	60%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less.....	60%
Larger, up to 3-in., list less.....	40–10%
Less than keg or case lots, add to list.....	10%
Washers:	
Wrought, full kegs, per 100 lb., list less.....	$4.00
Wrought, broken kegs, per 100 lb., list less.....	2.00
Turnbuckles:	
With stub ends, list less.....	20%
Without stub ends, list less.....	50%
Chain:	
Proof coil, base, per 100 lb., net.....	$7.10
Cast iron welding flux, per lb., net.....	.40
Brazing flux, per lb., net.....	.80

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Calif., Alhambra—H. M. Hanshue, c/o Western Air Express, 117 West 9th St., Los Angeles —machine shop equipment, etc., for proposed airplane factory on Valley Blvd. here. Estimated cost $300,000.

D. C., Washington — Bureau of Supplies & Accounts, Navy Dpt.—will receive bids until Oct. 1, for machine shop equipment including buffing lathes, motor driven Universal milling machine, blueprint machine, woodworking machine, heavy duty shapers, bending rolls machine, pneumatic scaling hammers, also until Oct. 8, for sheet metal cutter, disc sander machines, vertical keyseater, automatic screw machines, slotting machine, motor driven and oscillating spindle sanders.

Mass., Boston—Merrimac Oil Burner Co., 123 Merrimac St.—drill press, one hp. d.c., motor, electric drill and tapping attachments for ¼ to ½ in. pipe.

Mass., Edgartown — N. Mercer, State Rd., woodworking machinery for proposed 1 story shop.

Mass., Reading—S. R. Stembridge, 45 High St.—auto service station equipment, etc. for proposed 1 story repair and service garage at High and Haven Sts. Estimated cost $40,000.

Mass., Waltham (br. Boston) — Cedarcrest Farm—saw mill, large or pony saw, arbor and carriage.

Mich., Algonac—Gar Wood, Inc.—equipment for the manufacture of motor boat hulls for proposed 1 story, 75 x 400 ft. boat works. Estimated cost $75,000.

Mich., Berrien Springs—Clark Equipment Co., Buchanan — miscellaneous machine equipment for the manufacture of automobile axles for proposed 1 story, 130 x 205 ft. plant here. Estimated cost $75,000.

Mich., Detroit — Chrysler Corp., 12200 East Jefferson Ave.—general equipment for proposed 1 story, 160 x 160 ft. machine shop. Estimated cost $75,000.

Mich., Detroit—Dept. of Purchase & Supplies, Water Board Bldg., 735 Randolph St., J. E. Mills, Purch. Agt.—Hendey 12 in. x 6 ft. 12 speed head lathe.

Mich., Detroit — Koestlin Tool & Die Co., 3601 Humboldt Ave.—machinery and equipment for a 1 and 2 story, 65 x 120 ft. addition to die shop. Estimated cost $50,000.

Mich., Detroit—National Stamping Co., 617 Glover Ave. (metal stampings)—medium duty press.

Mich., Detroit—Universal Gear Works, Six Mile Rd. and G.T.R. Rd.—planer.

Minn., Minneapolis—City, F. S. Gram, Purch. Agt.—will receive bids until Sept. 30 for lathe.

Tex., Big Springs—Texas & Pacific Ry. Co., F. S. McClung, Purch. Agt. Dallas—is receiving bids for machinery and equipment for machine and blacksmith shops, etc. for proposed railway division terminal here. Estimated cost $1,000,000.

Ont., St. Catharines — Thompson Products, Inc., 2196 Clarkwood Rd., Cleveland, O.—complete machinery and equipment for the manufacture of valves, ties, rods, cranks, bolts, nuts, etc. for automobiles and aeroplanes at St. Paul St. W. here. Estimated cost $50,000.

Opportunities for Future Business

Calif., San Bruno—Heintz & Kaufman, 219 Natoma St., San Francisco, manufacturers of radio equipment is having plans prepared for the construction of first unit of factory 1 story at Tanforan Dist. Estimated cost $50,000. A. E. Neumarkel, 544 Market St., San Francisco.

Calif., San Francisco—Kresteller Motor Co., 2001 Market St., is having plans prepared for a 2 story, 160 x 290 ft. automobile sales and service building at Mission and 14th Sts. Estimated cost $225,000. A. Nordin, Mills Bldg., Archt.

Conn., East Hartford (br. Hartford)—Pratt & Whitney Aircraft Co., 450 Capital Ave., Hartford, awarded general contract for a 2 story, 400 x 1,500 ft. factory on South Main St. here. Estimated cost $1,500,000. Noted Aug. 1.

Conn., East Hartford (br. Hartford)—Chance Vought Co., c/o A. Kahn, Inc., Marquette Bldg., Detroit, Mich., Archt., will soon award contract for a 1 and 3 story, 240 x 545 and 50 x 185 ft. administration and factory buildings on Main St. here.

Conn., Plainville — Trumbull Electric Co., J. H. Trumbull, awarded contract for a 2 and 3 story, 60 x 125 and 50 x 125 ft. factory. Estimated cost $100,000.

Fla., Tampa—Aero & Auto Engineering Co., F. L. Ludwig, V. Pres., plans the construction of an airport including hangars, machine and woodworking shops, etc.

Ill., Chicago — Acme Card System Co., 8 South Michigan Ave., awarded contract for a 3 story, 50 x 78 ft. addition to factory for the manufacture of card systems, office equipment, etc. at 1748-56 Belmont Ave. Estimated cost $30,000.

Ill., Chicago—Chicago Rolling Mills, Inc., c/o Sessions Engineering Co., 228 South La Salle St., Engr., plans to expend $1,000,000 for expansion and reconditioning plant, also installation of necessary equipment including pen mills, motorization, etc., at 120th St. and Racine Ave.

Ill., Chicago—Eugene Dietzen Co., 954 Fullerton Ave., awarded contract for a 4 story, 116 x 139 ft. addition to factory for the manufacture of draftsmen's tools, surveyors instruments, etc. Estimated cost $195,000.

Ill., Chicago—Foster Bolt & Nut Mfg. Co., 6300 West 65th St., is having plans prepared for addition to manufacturing plant. Estimated cost $24,000. Foltz & Co., 510 North Dearborn St., Archts.

Ill., Chicago—International Tool & Engineering Co., 1910 South Kedzie Ave., plans a 1 story, 75 x 90 ft. addition to machine shop.

Ill., Chicago—Norton Co., 11 North Jefferson St., manufacturers of abrasive grinding wheels, sharpening stones, etc., plans the construction of a warehouse and part manufacturing plant at 47th Pl. and Turner Ave. Estimated cost $110,000. Mundie & Jensen, 39 South La Salle St., Archts.

Ill., Monsanto—Evans-Wallower Zinc Co., is having plans prepared for a 2 story addition to electrolytic plant. Estimated cost $1,000,000.

Ill., Rock Island — International Harvester Co., 606 Michigan Ave., Chicago, awarded contract for the construction of a 1 story wheel manufacture plant, here. Estimated cost $300,000.

Ind., Auburn—Auburn Auto Co., will receive bids until Oct. 1, for a 2 story, 200 x 240 ft. engineering building. Estimated cost $220,000. A. M. Strauss, 415 Cal-Wayne Bldg., Fort Wayne, Archt.

Ind., Evansville—Firestone Tire & Rubber Co., 101 South 4th St., is receiving bids for a 90 x 185 ft. machine shop and service station at 9th and Main Sts. Estimated cost $43,400. Fowler & Karges, 707 Furniture Bldg., Archts.

Ind., Evansville—Malleable Casting Co., had plans prepared for a 150 x 200 ft. foundry at 2549 Colm St. Estimated cost $44,200. Private plans.

Ind., Fort Wayne — Fries Tool Works, is having plans prepared for a 35 x 125 ft. factory. Estimated cost $43,400. G. Mahurin, Archt.

Ky., Louisville—Argonaut Realty Co., General Motors Bldg., Detroit, Mich., awarded contract for a 2 story, 176 x 206 ft. building including warehouse, offices and mechanics school, etc. at Hill St. between 15th and 16th Sts. here. Chevrolet Motor Co., subsidiary of General Motors Co., General Motors Bldg., Detroit, lessee.

Mass., Woburn — City, c/o H. P. Johnson, Mayor, awarded contract for a 1 and 3 story high school including manuel training department, etc. on Montvale Ave. Estimated cost $650,000. Noted Sept. 5.

Mich., Detroit—Silent Automatic Corp., 255 Meldrum Ave., is having plans prepared for the construction of a 7 story, 100 x 120 ft. factory for the manufacture of oil burners and equipment. Estimated cost $200,000. Private plans.

Mich., Flint—A. C. Spark Plug Co., Harriet St., awarded contract for a 2 story, 100 x 145 ft. spark plug factory. Estimated cost $75,000.

Mich., Jennings—Lakewood Development Co., Pontiac Bank Bldg., Pontiac, plans the construction of airplane hangars, machine shop, etc. in connection with proposed 3 story, 210 x 250 ft. hotel and club. Estimated cost $50,000. C. R. Van Buskirk, 10½ East Pike St., Pontiac, Archt.

Mich., Lansing — Olds Motor Works, 1101 Division Ave., is having plans prepared for a 2 story, 75 x 140 ft. addition to automobile factory on Division Ave. Estimated cost $75,000. Private plans.

Mich., Muskegon—Venton Steel Sash Co., had plans prepared for the construction of two 1 story factory buildings, 25,000 sq.ft. to be machine shops to produce steel sash. A. A. Wickland & Co., 222 North Wells St., Archts.

Mo., St. Louis—St. Louis Truck & Mfg. Co., 3200 North Hall St., awarded contract for a 1 story, 60 x 120 ft. factory at Railroad and Thatcher Ave.

N. J., Hoboken—Bonanno Bros., 1827 Bergen Turnpike, North Bergen, manufacturers of steam shovels and cranes, will build a 1 story, 70 x 140 ft. assembly and distribution plant, at Willow and Clinton Aves. here. Estimated cost $40,000. Private plans. Harnishfeger Sales Corp., 38th and National Ave., Milwaukee, Wis., lessee.

N. J., Jersey City—C. Shilowitz, 26 Journal Sq., Archt., will receive new bids about Oct. 1, for a 4 story, 150 x 230 ft. garage, etc. at Sip and Summit Aves. for J. Goldenberg, 80 Woodland St., Englewood. Estimated cost $500,000. Former bids rejected. Noted July 4.

N. J., Newark—Fougner & Gantier, 103 Park Ave., New York, N. Y., Archts., will receive bids about Oct. 1, for a 4 story, 100 x 140 ft. factory for Tung Sol Lamp Works, Inc., 95 8th Ave. Estimated cost $150,000.

N. J., West New York—De Luxe Auto Bodies, Inc., P. Wiskidensky, Pres., 5124 Hudson Blvd., is having sketches made for a 1 story, 115 x 125 x 151 ft. auto body manufacturing plant at Hudson Blvd. and 21st St. Estimated cost $40,000. Architect not announced.

N. Y., Evergreen—Corp., c/o B. Braunstein, 163-18 Jamaica Ave., Archt. will build a 2 story plumbing supply station at Cypress Hills and Myrtle Aves. here. Estimated cost $40,000.

N. Y., Forest Hills—Seal Lock Burial Vault, Inc., will soon award contract for the construction of a factory at 68th Rd. and Woodhaven, W. J. Boegel, 185 Madison Ave., New York, Archt.

N. Y., New York—Hudson Builders, L. Klost, Pres., 85 Southern Blvd., will receive bids about January 1 for the construction of a 2 story, 130 x 158 ft. garage at White Plains Ave. and Magento St. Estimated cost $150,000. Margon & Holder, 18 East 41st St., New York, Archts. Noted Aug. 22.

N. Y., New York—E. Marolo, 1412 White Plains Ave., will soon receive bids for the construction of a garage at 215th St. and White Plains Ave. Estimated cost $65,000. J. J. Dunnigan, 2382 Grand Concourse, Archt. Noted Aug. 22.

O., Cleveland—Cleveland Union Terminal Co., c/o C. L. Bradley, Pres., Terminal Tower, awarded contract for the construction of yard facilities, buildings including machine shop, wheel lathe house, blacksmith shop, coach yard house, signal maintenance building, etc. Estimated cost $350,000. Noted Sept. 19.

O., Tiffin—Sterling Grinding Wheel Co., is receiving bids for the construction of a 1 story factory. Estimated cost $50,000. G. S. Rider Co., Century Bldg., Cleveland, Archt.

Pa., Philadelphia—I. Fishman & Son, 10th and Allegheny Sts., manufacturers of soda fountains, awarded contract for a 1 and 2 story, 375 x 480 ft. factory at Erie and F Sts. Estimated cost $1,500,000.

Pa., Titusville—Titusville Iron Works, J. T. Dillon, Pres., awarded contract for a 1 and 2 story, 50 x 150 ft. factory. Estimated cost $200,000.

Tenn., Nashville—Pritchett-Thomas Co., Stahlman Bldg., awarded contract for a 7 story, 100 x 175 ft. garage and repair shop at 7th Ave. N. Estimated cost $500,000.

Tex., Dallas — Atlas Metal Works, 2601 Alamo St., plans the construction of a 1 story, 200 x 210 ft. factory on Browder Rd. Estimated cost $150,000.

Tex., El Paso—A. Tinnally, acquired a site and plans the construction of a factory for the manufacture of a patented preservative compound for metals to be known as "Tinallium." Estimated cost $2,000,000.

Tex., Houston — International Derrick & Equipment Co., 875 Michigan Ave., Columbus, O., acquired a 10 acre site near ship canal here and has work under way on a structural and galvanizing plant for the manufacture of Ideco products.

Tex., Houston—J. H. Jones, et al., Bankers Mortgage Bldg., plans a 5 story, 125 x 252 ft. garage on Travis St. Estimated cost $500,000. A. C. Finn, Bankers Mortgage Bldg., Archt. R. J. Cummins, Bankers Mortgage Bldg., Engr.

Ont., Hamilton — Steel Co. of Canada, awarded contract for the construction of a fence mill. Estimated cost $100,000.